VOLUME SIX
HUGUENOTS—LYRE BIRD

THE BRITISH
ENCYCLOPEDIA
IN TEN VOLUMES
ILLUSTRATED

THE BRITISH ENCYCLOPEDIA

ILLUSTRATED

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VOLUME
SIX

ODHAMS PRESS LIMITED
LONDON, W.C. 2

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Printed in Great Britain

KEY TO PRONUNCIATION

The method of marking pronunciations here employed is either (1) by marking the syllable on which the accent falls, or (2) by a simple system of transliteration, to which the following is the Key :

VOWELS

ā, as in *fate*, or in b*a*re.

ä, as in *a*lms, Fr. â*m*e, Ger. B*a*hn = á of Indian names.

å, the same sound short or medium, as in Fr. b*a*l, Ger. M*a*nn.

a, as in f*a*t.

ą, as in f*a*ll.

a, obscure, as in r*u*r*a*l, similar to *u* in b*u*t, ė in h*e*r : common in Indian names.

ē, as in m*e* = *i* in mach*i*ne.

e, as in m*e*t.

ė, as in h*e*r.

ī, as in p*i*ne, or as *ei* in Ger. m*ei*n.

i, as in p*i*n, also used for the short sound corresponding to ē, as in French and Italian words.

eu, a long sound as in Fr. je*û*ne = Ger. long ö, as in S*ö*hne, G*ö*the (Goethe).

eu, corresponding sound short or medium, as in Fr. p*eu* = Ger. ö short.

ō, as in n*o*te, m*oa*n.

o, as in n*o*t, s*o*ft—that is, short or medium.

ö, as in m*o*ve, t*wo*.

ū, as in t*u*be.

u, as in t*u*b : similar to ė and also to *a*.

ų, as in b*u*ll.

ü, as in Sc. ab*u*ne = Fr. *û* as in d*û*, Ger. *ü* long as in gr*ü*n, B*ü*hne.

ů, the corresponding short or medium sound, as in Fr. b*u*t, Ger. M*ü*ller.

oi, as in *oi*l.

ou, as in p*ou*nd ; or as *au* in Ger. H*au*s.

CONSONANTS

Of the *consonants*, **b, d, f, h, j, k, l, m, n, ng, p, sh, t, v, z,** always have their common English sounds, when used to transliterate foreign words. The letter **c** is not used by itself in re-writing for pronunciation, **s** or **k** being used instead. The only consonantal symbols, therefore, that require explanation are the following :

ch is always as in ric*h*.

d, nearly as *th* in *th*is = Sp. *d* in Ma*d*rid, etc.

g is always hard, as in *g*o.

h represents the guttural in Scotch lo*ch*, Ger. na*ch*, also other similar gutturals.

n̨, Fr. nasal *n* as in bo*n*.

r represents both English *r*, and *r* in foreign words, which is generally much more strongly trilled.

s, always as in *s*o.

th, as *th* in *th*in.

th, as *th* in *th*is.

w always consonantal, as in *w*e.

x = ks, which are used instead.

y always consonantal, as in *y*ea (Fr. *ligne* would be re-written lēny).

zh, as *s* in pleasure = Fr. *j*.

THE BRITISH ENCYCLOPEDIA

VOLUME VI

HUGUENOTS (hu'ge-nots), a term of unknown origin, applied by the Roman Catholics to the Protestants of France during the religious struggles of the sixteenth and seventeenth centuries. During the early part of the sixteenth century the doctrines of Calvin, notwithstanding the opposition of Francis I, spread widely in France. Under his successor, Henry II (1547–59), the Protestant party grew strong, and under Francis II became a political force headed by the Bourbon family, especially the King of Navarre and the Prince de Condé.

At the head of the Catholic party stood the Guises, and through their influence with the weak young king a fanatical persecution of the Huguenots commenced. The result was that a Huguenot conspiracy, headed by Prince Louis de Condé, was formed for the purpose of compelling the king to dismiss the Guises and accept the Prince de Condé as regent of the realm. But the plot was betrayed, and many of the Huguenots were executed or imprisoned.

Massacre of St. Bartholomew's. In 1560 Francis died, and during the minority of the next king, Charles IX, it was the policy of the queen mother, Catherine de' Medici, to encourage the Protestants in the free exercise of their religion in order to curb the Guises. But in 1562 an attack on a Protestant meeting made by the followers of the Duc de Guise commenced a series of religious wars which desolated France almost to the end of the century. Catherine, however, began to fear that Protestantism might become a permanent power in the country, and suddenly making an alliance with the Guises, between them they projected and carried out the massacre of St. Bartholomew's (25th Aug., 1572). The Protestants fled to their fortified towns and carried on a war with varying success.

On the death of Charles IX, Henry III, a feeble sovereign, found himself compelled to unite with the King of Navarre, head of the House of Bourbon and heir apparent of the French crown, against the ambitious Guises, who openly aimed at the throne, and had excited the people against him to such a degree that he was on the point of losing the crown. After the assassination of Henry III the King of Navarre was obliged to maintain a severe struggle for the vacant throne; and not until he had, by the advice of Sully, embraced the Catholic religion (1593) did he enjoy quiet possession of the kingdom as Henry IV.

Edict of Nantes. Five years afterwards he secured to the Huguenots their civil rights by the Edict of Nantes, which confirmed to them the free exercise of their religion, and gave them equal claims with the Catholics to all offices and dignities. They were also left in possession of the fortresses which had been ceded to them for their security. This edict afforded them the means of forming a kind of republic within the kingdom, which Richelieu, who regarded it as a serious obstacle to the growth of the royal power, resolved to crush. The war raged from 1624 to 1629, when Rochelle, after an obstinate defence, fell before the royal troops; the Huguenots had to surrender all their strongholds, although they were still allowed freedom of conscience under the ministries of Richelieu and Mazarin.

But when Louis XIV and Madame de Maintenon set the fashion of devoutness, a new persecution of the Protestants commenced. They were deprived of their civil rights, and bodies of dragoons were sent into the southern provinces to compel the Protestant inhabitants to abjure their faith. The Edict of Nantes was revoked in 1685, and by this act more than 500,000 Protestant subjects were driven out to carry their industry, wealth, and skill to other countries. In the reign of Louis XV a new edict was issued repressive of Protestantism, but so many voices were raised in favour of toleration that it had to be revoked. The Revolution first put the Protestants on an equality with their Catholic neighbours.—BIBLIOGRAPHY: A. Galton, *Church and State*

in France; N. A. F. Puaux, *Histoire populaire du Protestantisme français*; C. W. Baird, *History of the Huguenot Immigration to America*; R. L. Poole, *Huguenots of the Dispersion*.

HUIA-BIRD, the native name of a genus of New Zealand starlings, *Heteralocha acutirostris* or *Neomorpha Gouldii*, comprising a single species of birds, occupying a very limited space in a few densely-wooded mountain ranges. The plumage is a very dark green, appearing to be black in some lights, the tip of the tail white. The most striking peculiarity about this bird is that the male has a stout, straight beak, used for chipping the bark from decayed trees; the female a long, slender, curved one, by which crevices in the wood are explored for insects.

HULL, a city of Canada, province of Quebec, on the left bank of the Ottawa, opposite to the city of Ottawa. It has large saw-mills, and manufactures of paper, paper pulp, wooden wares, and furniture. Pop. (1931), 29,433.

HULL, official name **KINGSTON-ON-HULL,** a river port, municipal and parliamentary borough of England, and a county of itself, in the East Riding of York, at the influx of the Hull into the estuary of the Humber. The town stands on a low and level tract of ground, and stretches along the banks of the Humber, from the inundations of which it is secured by strong embankments.

Amongst the notable public buildings and institutions are the town hall, the new exchange, the corn exchange, dock offices, &c., the royal institution, the public rooms, Hull and East Riding College, Reckitt Free Library, the infirmary, dispensary, children's hospital, &c. A university college was founded in 1927. There are three well-laid-out public parks.

The industries of the town are varied, comprising flax- and cotton-mills, ship-building, rope- and sail-works, iron-foundries, machine-making, seed-crushing, colour-making, oil-boiling, &c.; but its importance arises chiefly from its shipping commerce, Hull being one of the busiest seaports in the kingdom. It is the third port in the United Kingdom, being exceeded only by London and Liverpool. The docks are amongst the largest in the kingdom. It is on both the L.N.E. & L.M.S. Railways and a steam ferry connects it with New Holland in Lincolnshire.

It is an ancient town, and was of some importance long before it received its charter from Edward I. It played a conspicuous part during the Civil War, being held by the Parliamentary forces, and twice besieged without success. It has four parliamentary divisions, East, Central, North-West, and South-West, each of which returns one member. There is an aerodrome at Hedon. Pop. (1931), 313,366.

HULLAH, John Pyke, an English musician, born in 1812, died in 1884. He entered the Royal Academy of Music in 1832, and attracted some attention by his comic opera *The Village Coquettes* (1836), which was followed by *The Barber of Bassora* in 1837, and *The Outpost* in 1838. About this time he began to work for the establishment of popular singing-schools. He wrote some books, amongst which are *Grammar of Harmony*, *Grammar of Counterpoint*, and *A History of Modern Music*.

HULSE'AN LECTURES, a series of discourses delivered annually at Cambridge, under a bequest by the Rev. John Hulse (1708–90). The lectures must not be fewer than four or more than six. The subject prescribed is the evidences of revealed religion, or the explanation of the most difficult texts or obscure parts of Holy Scripture. The persons eligible as lecturers are Masters of Arts of the University of Cambridge.

HULTON, name of three districts near Bolton, Lancashire. **Little Hulton** is an urban district, 192 miles from London by the L.M.S. Rly. and 4 miles from Bolton. Here are collieries. Pop. (1931), 7,878. The other two are **Middle** and **Over Hulton.**

HULTON, Sir Edward. Newspaper proprietor. The son of Edward Hulton, he was born at Ashton-on-Mersey in 1869, and married Millicent, daughter of John Warriss. He was knighted in 1919 and died in 1928.

HULUTAO, an ice-free port on Lienshan Harbour, Gulf of Liaotung, Manchuria. The Chinese are developing it in opposition to the Japanese port of Dairen.

HUMANISM AND HUMANISTS. Humanism is a term applied to the literary and intellectual movement which started at the close of the Middle Ages, in the fourteenth century, and ended in the sixteenth. Its object was the revival of classical antiquity and pagan learning. It was essentially a literary and intellectual movement, attempting to emancipate education and thought from the shackles of scholasticism. By establishing a contact with the great minds of classical antiquity, it led the way to a revival of learning and stimulated erudition, art, and literature. It also accentuated the meaning and worth of mundane life and of human nature,

and strenuously opposed mediæval thought and dogmatic teaching.

The word humanism is derived from *humanitas* in its sense of "mental culture befitting a man, or liberal education," as used by Cicero and Aulus Gellius. It meant, therefore, the study of humane letters, of the languages and literatures of Greece and Rome, as some of the humanists maintained that the study of Greek and Roman classics was the only way to gain humane culture. The humanists were the scholars and poets who endeavoured to revive, not only the literature of ancient Hellas and Rome, but also the pagan spirit of the cults of antiquity. They were all great lovers of learning, admirers of beauty of form and of thought, partisans of a broader outlook upon life, and of a humanity of spirit, rebels, therefore, against the dogmatism of the Middle Ages and their cramping tenets and laws. From beneath the lumber accumulated during the Dark Ages they disinterred and brought forth the treasures of the past, and restored to Europe a new means of culture.

There were already precursors of humanism in the thirteenth century, but it was in the fourteenth century that the movement began in Italy. For centuries, all through the Dark Ages, man had lain dreaming or half awake under a veil woven of faith, illusion, and childish prepossession. He was conscious of himself merely as a member of a people, a race, a family, or a party. Feudalism and ecclesiasticism, Church and State, were all-powerful and had put their restrictions even upon the intellectual activities of the individual. Mediæval ecclesiasticism had cramped man's views, had imposed upon him an artificial system of thought and a supernatural conception of the universe.

Growth of Individualism. A new era, however, began to dawn in Italy of the fourteenth century. The states of Italy furthered civic liberty and encouraged a mundane conception of life, freedom of thought, and, above all, the claims of individuality. Under these influences man began to consider himself a spiritual being. The spirit of revolt moved its wings, and mediæval man, the slave and bondman of feudalism and of ecclesiasticism, dared to think for himself. The rays of a new dawn tinted with orient hues the sombre sky of mediævalism, and accentuated the worth and meaning of human nature, human individuality, and human personality. It has been rightly said that "the growth and development of individualism, the doctrine that man should think for himself, a mental function which had been neglected during the age of mental slavery, was one of the brightest victories of the humanists."

This growth of individualism in Italy prepared the human mind for an interest in ancient life and literature. The realization had gradually grown upon the newly awakened individual that behind him, in the past, lay a history which could teach him many things. Weary of scholasticism, weary of the ecclesiastical chains, he turned to the freedom of antiquity, to the study of Greek thought and culture, religion, art and literature, which had all "extolled the beauty of nature and the joy of life." It was quite natural that the spirit of antiquity should be first revived in Italy, where the remains of an ancient civilization still existed, and where the spirit of paganism still lingered. Indeed, the spirit of antiquity and of paganism, never dead in Italy, but lulled to sleep by the whisperings of religious mysticism, or hypnotized by the powerful gaze of Papacy, was awakened, like an enchanted princess, by the kiss of the Italian poets.

Historical Survey. The founder of humanism, in so far as it had an individual founder, was Petrarch (1304–74), the great lyric poet, but in Dante (1265–1321), though he is best regarded as giving final expression to the loftiest spirit of mediævalism, we see clearly the advent of the new spirit. Petrarch was an enthusiastic student of Roman antiquity, and an untiring collector of manuscripts. He perceived the importance of a knowledge of Greek, though he never really learned it himself. Boccaccio (1313–75) also had the passion for collecting which was to characterize all the early humanists, and may be regarded as the first Grecian of the modern world, since he learned the Greek language from Leontius Pilatus, a Greek resident in Florence. The real introducer of the Greek language into Italy, however, was Manuel Chrysoloras, a native of Byzantium, who began to teach at Florence in 1396.

The humanists soon attained a position of the greatest importance in Italy. Their lectures were attended by immense numbers from all ranks of society, and wealthy men vied with one another in patronizing them. The Popes themselves were for a long time in the main favourably disposed to humanism, and some of them, notably Nicholas V, Pius II, and Leo X, were humanists of no mean order themselves. Among other notable patrons of the humanist movement the names of Cosmo and Lorenzo de' Medici in Florence, and Alfonso, King of Naples, are pre-eminent.

Florence, on the banks of the Arno,

became the seat of learning, and from the Medicean gardens the new vivifying stream came forth to water the barren land of mediævalism. Forth from Italy the movement spread and passed into Germany, Spain, Holland, France, and England. Jean de Montreuil, Guillaume Budé, and Étienne Dolet in France; Reuchlin Hutten and Melanchthon in Germany; Thomas Linacre, William Grocyn, William Lily, and Sir Thomas More in England; and Erasmus of Rotterdam in Holland, are a few of the most prominent humanists.

Humanism also means the tendency to regard human life as an independent centre of interest, and to explain the rest of the universe by reference to man's life. *See* PRAGMATISM.—BIBLIOGRAPHY: J. A. Symonds, *The*

Baron von Humboldt

Renaissance in Italy; J. Burckhardt, *The Civilization of the Renaissance*; A. Pearson, *A Short History of the Renaissance in Italy*; J. S. Mackenzie, *Lectures on Humanism*; Sir J. E. Sandys, *History of Classical Scholarship*.

HUMANITIES is a term which arose in the fifteenth century, and was applied to the study of the classical literatures of Greece and Rome. It owes its origin to the word *humanitas* as used by Cicero and Aulus Gellius in the sense of culture as befitting a man as a man. The scholastics used *literæ humaniores* (more humane letters) in contradistinction to *divinitas* (or the study of divinity and theology). The humanists of the early Renaissance, on the other hand, gave to the word humanities the significance of culture and the study of the ancient classics, since, as they maintained, culture could only be gained by studying the works of Greek and Roman authors.

In the Scottish universities the term humanity, in the singular, still designates the study of the Latin language and literature, and at Oxford *literæ humaniores* is applied to classical studies. In a wider sense the term humanities is now used to include the sciences concerned with human civilization, i.e. not only philology, but also philosophy, history, and political science.

HUMBER, a large river (estuary), on the east of England, between the counties of York and Lincoln. At its western extremity it is joined by the Ouse, after the latter has been augmented by the Derwent and Aire; below Goole it receives the Don, lower down the Trent, and still lower the Hull from the opposite side. It is about 35 miles long, and varies in breadth from 1 to 7 miles. There is at all times a considerable depth of water in the fairway of the channel, and the navigation is safe and easy.

HUMBERT I, Umberto, King of Italy, born 14th March, 1844, eldest son of Victor Emmanuel II. In the war of 1866, in which Italy joined Prussia against Austria, he took the field in command of a division, and distinguished himself by his bravery in the disastrous battle of Custozza. In 1868 he married his cousin, Margherita, daughter of Duke Ferdinand of Genoa. He succeeded his father on 9th Jan., 1878, and was assassinated by an anarchist named Bresci on 29th July, 1900. Humbert was succeeded by his son Victor Emmanuel III.

HUMBOLDT (hum'bolt), **Friedrich Heinrich Alexander, Baron von**, a German traveller and naturalist, was born 14th Sept., 1769, at Berlin, where his father held the post of royal chamberlain, and died in 1859. He studied at the Universities of Frankfort-on-the-Oder, Berlin, and Göttingen, and also at the commercial academy in Hamburg. His first work was *Observations on the Basalt of the Rhine* (1790).

In 1791 he studied mining and botany at the mining school in Freiberg, and subsequently became overseer of the mines in Franconia. In 1797 he resolved to make a scientific journey in the tropical zones along with a friend, Aimé Bonpland. They landed at Cumana, in South America, in July, 1799, and spent five years in exploring scientifically the region of the Orinoco and the upper part of the Rio Negro, the district between Quito and Lima, the city of Mexico and the surrounding country,

and the Island of Cuba. In 1804 they arrived at Bordeaux, bringing with them an immense mass of fresh knowledge in geography, geology, climatology, meteorology, botany, zoology, and every branch of natural science, as well as in ethnology and political statistics.

Humboldt selected Paris as his residence, no other city offering so many aids to scientific study, and remained there arranging his collections and manuscripts till March, 1805. He then visited Rome and Naples in company with Gay-Lussac, but eventually returned to Paris in 1807, when the first volume of his great work, *Voyage aux régions équinoxiales du nouveau continent*, appeared; the thirtieth and last was published in 1827.

In 1827 Humboldt, who had been offered several high posts by the Government of Prussia, and had accompanied the king on several journeys as part of his suite, was persuaded to give up his residence at Paris and settle at Berlin, where he combined the study of science with a certain amount of diplomatic work. In 1829, under the patronage of Tsar Nicholas I, he made an expedition to Siberia and Central Asia, which resulted in some valuable discoveries, published in his *Asie Centrale*. In 1835 he published at Paris his *Examen critique de la géographie du nouveau continent*.

In 1845 appeared the first volume of the *Cosmos*, his chief work, a vast and comprehensive survey of natural phenomena, in which the idea of the unity of the forces which move below the variety of nature is thoroughly grasped.—Cf. R. H. Stoddard, *Life, Travels, and Books of Alexander Humboldt*.

HUMBOLDT, Karl Wilhelm, Baron von, brother of the preceding, was born at Potsdam in 1767, died in 1835. He studied at Berlin, at Frankfort-on-the-Oder, and at Göttingen. After travelling in France and Spain, and acting as Prussian minister at Rome, he was called to fill the office of Minister of the Interior in connection with ecclesiastical and educational matters, and had a share in the reform of Prussian education. In 1810 he became Minister Plenipotentiary to Vienna, took an active part in the conclusion of the Peace of Paris (1814), and at the Congress of Vienna (1815), and other great diplomatic transactions. In 1819 he was an active member of the Prussian ministry, but resigned and retired to his estate at Tegel, where he died.

His works include poems and literary essays, but by far the most valuable are his philological writings, such as *Additions and Corrections to Adelung's Mithridates, Researches regarding the Original Inhabitants of Spain in Connection with the Basque Language, On the Kawi Language of Java*, and *On the Diversity of Language and its Influence on the Development of Speech*.

HUME, David, an eminent historian and philosopher, was born at Edinburgh on 26th April, 1711, died 25th Aug., 1776. He was destined for the law, but was drawn away by his love of literature and philosophy, and retired to France, where during three years of quiet and studious life he composed his *Treatise upon Human Nature*. The work was published at London in 1738, but, in his own words, "fell dead-born from the press." His next work, *Essays, Moral, Political, and Literary* (Edinburgh, 1742), met with a better reception. In 1745 he became companion to the insane Marquess of Annandale; and he accompanied General St. Clair in 1746 and 1747 on his expedition against France and on a military embassy to Vienna and Turin. He now published a recasting of his *Treatise upon Human Nature*, under the title of an *Inquiry Concerning the Human Understanding* (1747).

In 1752 he published his *Political Discourses*, which were well received, and his *Inquiry Concerning the Principles of Morals*. The same year he obtained the appointment of librarian of the Advocates' Library at Edinburgh, and began to write his *History of England*, of which the first volume appeared in 1754. It was, like most of the succeeding volumes, severely attacked both for its religious and political tendencies; but, in spite of adverse criticism, his *History of England*, after its completion in 1761, was recognized as a standard work. Its merits are chiefly clearness and force of narrative and philosophical breadth of view in the judgment of men and events.

In 1763 he accepted an invitation from the Earl of Hertford, then proceeding as Ambassador to Paris, to accompany him, and was enthusiastically received by Parisian circles in his character of philosopher and historian. After the departure of Lord Hertford in 1756, he remained as chargé d'affaires, and returned to England in 1766, bringing with him Rousseau, for whom he procured a pension and a retreat in Derbyshire. But the morbid sensitivity of Rousseau brought about a disagreement which put an end to the friendship. In 1767 he was appointed Under-Secretary of State, a post which he held till 1769, when he retired to Edinburgh, where he lived till his death.

As a philosopher, in which quality his reputation is perhaps greatest, Hume's acute sceptical intellect did great service by directing research to the precise character of the fundamental conceptions on which our knowledge and our beliefs are based. His philosophy has been regarded as a continuation and a culmination of the line of thought begun by Locke and Berkeley. Hume's philosophy, however, was more than a mere development of the ideas of Locke and Berkeley, his predecessors. His acute negative criticism of these conceptions (e.g. his reduction of the ideas of personal identity, conscience, and causality, to mere effects of association) compelled philosophy either to

Humming-birds, 1, Sword-billed, 2, Racket-tailed, 3, Fork-tailed, 4, Horned or Sun-gem

come to a dead halt or to find, as Kant did, a new and profounder view of the nature of human reason.—BIBLIOGRAPHY: W. Knight, *Hume* (in Philosophical Classics); J. Hill Burton, *Life and Correspondence of David Hume*; T. H. Huxley, *Hume* (English Men of Letters Series); J. Seth, *English Philosophers and Schools of Philosophy*.

HUME, Joseph, politician and economist, born at Montrose in 1777, died in 1855. After studying medicine at Edinburgh he was appointed marine assistant-surgeon in the service of the East India Company. Having qualified himself by a diligent study of the native languages, he obtained several lucrative posts connected with the Commissariat and the Pay Office, and in 1808, when only in his thirty-first year, he was able to return to Europe with a considerable fortune. After making a tour in Southern Europe and Egypt he became in 1812 Tory member for the 'rotten borough' of Weymouth; but losing his seat in 1813, began to take an active part in regard to Lancasterian schools, savings banks, and other measures of social reform.

In 1818 he was again returned to Parliament as member for the Aberdeen district of burghs. It was now that he began his carcer as an active advocate of reforms, such as the emancipation of the Catholics, the repeal of the Test and Corporation Acts, and economy in public expenditure. He had no power as an orator, his strength lying in his handling of figures and the tenacity and energy with which he carried on his crusade against corruption. After representing Middlesex and Kilkenny County he was returned by the Montrose burghs in 1842, and continued to represent them till his death.

HUMMING-BIRDS, the name given to a family (Trochilidæ) of minute and beautiful birds, so called from the sound of their wings in flight. The beak is slender, generally long, sometimes straight and sometimes curved; the tongue is long, filiform, bifid at the point, and capable of being protruded to a considerable distance. In size humming-birds vary from that of a wren to that of a humble-bee. They never alight to take food, but feed while on the wing, hovering before a flower, supported by a rapid vibratory movement of the wings which produces the humming noise. Insects form a great proportion of their food.

Species. These beautiful birds are peculiar to America, and mainly tropical, though they range from Alaska to Tierra del Fuego. One species, the ruby-throated hummingbird (*Trochilus colubris*), is common in the north-east of the United States and in Canada. The only note of the humming-bird is a single chirp, not louder than that of a cricket. It is very fearless and irascible, two males scarcely ever meeting without a contest. Among the more remarkable of these birds is the tufted-necked humming-bird (*Ornismya ornāta*) of Guiana and Northern Brazil. In this species the crest, outer tail-feathers, and neck-plumes are reddish chestnut, the latter tipped with green, the throat and upper part of the breast are emerald green, the back bronze green. About five hundred species of humming-birds are now known.

HUMPERDINCK, Englebert, German composer. Born at Siegburg, 1st Sept., 1854, he studied at Munich and in Italy, and helped Wagner to produce *Parsifal* He became professor of composition at Frankfort, moving to Berlin in 1900. His works are frequently based on peasant music, notably his delightful children's opera, *Hänsel and Gretel*. He died 27th Sept., 1921.

HUMUS, a substance which occurs in vegetable mould, and in liquids containing decomposing vegetable matter. Humus as it exists in the soil is a product of the decay of vegetation or stable manure. It is a mixture of various carbon compounds, which slowly undergo combustion with the production of carbon dioxide, water, and ammonia, which are again taken up by plants. It is characterized by its powers for the retention of water in a soil, improvement of aeration, and it facilitates the mechanical operation of tillage.

HUNDRED, in England, a division of a shire or county. It was so called, according to some writers, because each hundred found 100 sureties of the king's peace, or 100 able-bodied men of war. Others think it to have been so called because originally composed of 100 families. Hundreds are said to have been first introduced into England by Alfred. Formerly if a crime was committed, such as robbery, arson, killing or maiming cattle, destroying turnpikes or works on navigable rivers, the hundred had to make it good; but hundreds are now only liable for damage done by rioters acting feloniously. *See* CHILTERN HUNDREDS.

HUNDRED YEARS' WAR, struggle between England and France. It began in 1338 when Edward III claimed the throne of France. The English won victories at Crécy and Poitiers, and in 1360 peace was made at Bretigny. By this Edward secured much of France, but not the crown. The war began again in 1369 and lasted, with intervening truces, until 1396. By the treaty of 1396 the English lost a good part of their possessions.

Another period of warfare began in 1403. In 1415 Henry V, claiming the throne of France, made it a more serious affair. He won the Battle of Agincourt, conquered Normandy, and in 1420, by the Treaty of Troyes, was recognized as Regent and future King of France. However, part of the nation objected to English rule and the war went on until 1429, when the tide turned on the arrival of Joan of Arc. The English then steadily lost ground and the struggle ended in 1453, all France, except Calais, being lost.

HUNGARY, an independent European state bounded by Yugoslavia, Austria, Czechoslovakia, and Rumania. Before 1918 it formed the major part of the dual monarchy of Austria-Hungary, but it is now a kingdom with a vacant throne. (For post-war history *see page* 19.) The head of the State is a regent. The area of Hungary is 35,875 sq. miles (half its former size), and the population (1930), 8,688,349 (92·1 per cent being Magyars and 5·5 per cent Germans). The areas of the old kingdom which were given to Rumania, Yugoslavia, and Czechoslovakia included the country's most valuable and most necessary coal and oil districts.

Hungary is now a great plain, low and marshy in the west around Lake Balaton, and gradually rising in the north-east to the foothills of the Carpathians. The chief rivers are the Danube and the Theiss and their affluents, and the Drava. Lake Balaton is the largest Central European lake.

Production & Industry. Hungary is exceedingly fertile, and agricultural pursuits employ more than 50 per cent of the total population. The chief crops are wheat, maize, rye, barley, potatoes, oats, and sugar-beet. Other products are tobacco, saffron, hemp, flax, fruit (especially grapes), and cotton (in very small quantities). The north shore of Lake Balaton is a famous wine district, and excellent wine (Tokaj) comes from the hilly country in the north-east. Forests cover 2,704,502. acres. Other industries are milling, distilling, beet-sugar refining, the manufacture of hemp and flax products, and textile manufacture (about 150 factories). In 1931, 6,887,620 tons of brown coal were produced. Rock salt and precious metals are found in the Carpathian foothills. The fisheries on the Danube, the Theiss, and on Lake Balaton are important.

Commerce. In 1932 the total value of exports was 331,500,000 pengös, and of imports 336,700,000 pengös. The chief exports were (in order of value) livestock, flour, wheat, sugar, machinery, and wine.

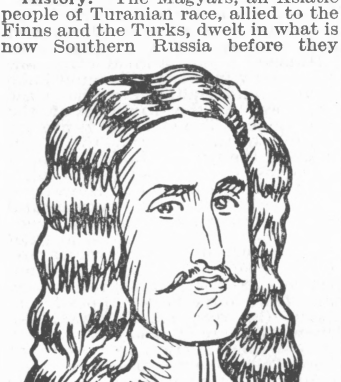
Communications. There are in Hungary about 5,381 miles of railway track, the electrification of certain sectors being under consideration. There are five air lines. There is a certain amount of Hungarian shipping on the Danube, and a free port has been made on the Csepel Island. The total road mileage is 16,893 miles, of which 5,152 miles are inferior.

Religion and Education. All religions are tolerated, and on an equality, but 64·9 per cent of the entire population are Roman Catholics, and 20·9 per cent Helvetian Evangelicals. Education is

free and compulsory, and there are four universities (Budapest, Szeged, Pécs, and Debrecen), an independent Faculty of Economics at Budapest, and numerous other colleges and schools.

Defence, &c. The national army has 35,000 men. Other armed forces are 12,000 gendarmerie, 12,000 police, 6,360 customs guards, 1,600 river guards, and 3,000 finance guards. The chief towns are Budapest (the capital), Szeged, Debrecen, Kecskemet, and Hodmezövasarhely. The unit of currency is the *pengö* of 100 *fillér*, the value of which is about 8½*d.* sterling.

History. The Magyars, an Asiatic people of Turanian race, allied to the Finns and the Turks, dwelt in what is now Southern Russia before they



Leopold I, Hungary

descended under Arpád into the plain of the Danube, towards the end of the ninth century, and conquered the whole of Hungary and Transylvania. During the first half of the tenth century their invasions and incursions spread terror throughout Germany, France, and Italy; but at length their total defeat by Otho I of Germany put an end to their maraudings, and under their native dynasty of Arpáds they settled down to learn agriculture and the arts of peace.

Stephen I (997–1030) was the first who was successful in extending Christianity generally amongst the Hungarians, and was rewarded by a crown from Pope Sylvester II and with the title of *apostolic king* (1000). Stephen encouraged learning and literature, and under him Latin became not only the official language of the Government, but the vehicle of Hungarian civilization, which it continued to be for the next 800 years. In 1089 King Ladislaus extended the boundaries of Hungary by the conquest of Croatia and Slavonia, and King Coloman by that of Dalmatia in 1102.

During the twelfth century the Hungarians first attained, through French connections, a certain refinement of life and manners. About the middle of the thirteenth century King Bela induced many Germans to settle in the country, which had been depopulated by the Mongol invasions. With Andrew III (1290–1301) the male line of the Arpád dynasty became extinct, and the royal dignity now became purely elective. Charles Robert of Anjou was the first elected (1309).

Louis I (1342–82) added Poland, Red Russia, Moldavia, and a part of Serbia to his kingdom. The reign of Sigismund (1387–1427), who was elected Emperor of Germany, is interesting from the invasion of Hungary by the Turks (1391), and the war with the Hussites. Sigismund introduced various reforms, and founded an academy at Buda. Matthias Corvinus (1458–90), combining the talents of a diplomatist and general, was equally successful against his enemies at home and abroad, and is even yet remembered by the popular mind as the ideal of a just and firm ruler. He founded a university at Pressburg.

During the reigns of Ladislaus II (1490–1516) and Louis II (1516–26) the rapacity of the magnates and domestic troubles brought the power of Hungary low, and the battle of Mohacs (1526) made a great part of the country a Turkish province for 160 years. The rest was left in dispute between Ferdinand of Austria and John Zapolya; but eventually, by the help of the Protestants, passed to the former, and remained under the sceptre of the Habsburgs till 1918. In 1686 Leopold I took Buda and recovered most of Hungary and Transylvania.

In 1724 Charles VI secured by the Pragmatic Sanction the Hungarian crown to the female descendants of the House of Habsburg, and the loyalty of the Hungarians to his daughter, Maria Theresa, saved the dynasty from ruin. Maria Theresa did much for the improvement of Hungary by the promulgation of the rural code called Urbarium, and by the formation of village schools.

On the advent of the French Revolution, and during the wars which ensued, the Hungarians once more played a prominent part in sup-

port of the Habsburg crown. Napoleon fell, but the Revolution had given an impetus to ideas of national and popular rights which the Hungarians, long stifled under the Germanic traditions and tendencies of their rulers, were amongst the first to feel. For a time Francis I and Metternich stood stiffly out against all concessions, and tried to govern by pure absolutism, but ended by summoning in 1825 a new Diet. The Diet distinguished itself by adopting the Magyar language in its debates instead of the Latin to which it had been accustomed. Succeeding Diets in 1830 and 1832 made new demands in the direction of religious equality, a popular suffrage, and abrogation of the privileges of the nobles.

The Austrian Government attempted to repress the Hungarian national movement by imprisoning Deák, Kossuth, and others of the leaders. The struggle continued till 1848, when the French Revolution of that year gave an impetus to a similar rising in Vienna. Prince Metternich fled to London, and the Viennese court made a formal concession of all important demands; but these had no sooner been granted than the Government began secretly to work against their being put in operation. The dependencies of the Hungarian crown, the Croats and the Wallachians of Transylvania, were privately encouraged to revolt, and in December of the same year an Austrian army took the field with the avowed object of annihilating the independence of Hungary; but a series of pitched battles resulted on the whole so much in favour of the Hungarians that Austria was obliged to call in the aid of Russia, which was at once granted.

After an heroic struggle the Hungarians had to succumb. The nation was reduced to the position of a province, and some of the greatest statesmen and soldiers of Hungary perished on the scaffold. But the struggle was continued by the Hungarians in the form of a constitutional agitation, and at last, when the battle of Sadowa in 1866 separated Austria from Germany, Austria, left face to face with a nation almost as powerful and numerous as itself, felt compelled to submit. In 1867 a separate Constitution and administration for Hungary was decreed, and on 8th June the emperor and empress were crowned King and Queen of Hungary with the utmost pomp, according to the ancient ceremonies of a Hungarian coronation. The dualism of the Austrian Empire was thus finally constituted. It was indeed but the partial recognition of the fact that the empire was a heterogeneous assemblage of communities, bound together only by having fallen to the House of Habsburg. The relations between Austria and Hungary remained always contentious and even at times acute, as over the demand of Hungary for a separate national bank in 1909.

The European War brought Hungary enthusiastically to the side of Austria, as the Magyars feared the Slavonic propaganda of Russia more than Austria. On 31st Oct., 1918, a revolution broke out in Hungary, and on 13th Nov. King Charles abdicated. On 16th Nov. Hungary was proclaimed an independent republic, with Count Michael Karolyi as Provisional President. Count Karolyi resigned on 22nd March, 1919, and his Cabinet was succeeded by a Bolshevist ministry which proclaimed the dictatorship of the proletariat. The leader was Bela Kun, who set up a Soviet Government.

An opposition National Government was set up at Arad and Szeged, and with the assistance of the Rumanian army, which had invaded Hungary, Bela Kun's Government was overthrown, and a new Government under Archduke Joseph was established on 7th Aug., 1919. As the Supreme Council refused to recognize the Archduke's Government, Admiral von Horthy was elected Regent of Hungary on 1st March, 1920. The new Government regarded the period between the revolutions of 1918 and 1919 as *de jure* a blank space of time, and on 23rd March, 1920, the Cabinet issued a declaration that Hungary was a monarchy with a vacant throne, and ruled by a regent. The Treaty of Trianon, between Hungary and the Allies, was signed at the Grand Trianon, Versailles, on 4th June, 1920. In March and Oct., 1921, two *coups d'état* to restore Charles of Habsburg as King of Hungary failed.—BIBLIOGRAPHY: A. Vambéry, *Hungary in Ancient and Modern Times*; P. Alden, *Hungary of To-day*; E. Sayous, *Histoire générale des Hongrois*; Papp and Erdelyi, *Les Magyars peints par eux-mêmes*; A. B. Yolland, *Hungary*; A. de Hevesy, *Nationalities in Hungary*; Louis Leger, *History of Austria-Hungary*.

Hungarian Literature. Hungarian literature is mostly of modern origin, i.e. dating from the beginning of the nineteenth century. With the introduction of Christianity into Hungary, Latin became the dominant language and the medium of literary expression. Poetical efforts were, however, made in the vernacular during the early Middle Ages, and there is a version of the Bible in Hungarian dating from the fourteenth century.

Lyric poetry was cultivated during the sixteenth and seventeenth centuries, and Gyöngyös, Liszti, and particularly Count Nicholas Zrinyi (The Siege of Szigetoar) may be mentioned. The development of Hungarian literature was stopped by the Austrian Government at the beginning of the eighteenth century, but towards 1780 a reaction ensued, a literary awakening took place, and the renaissance of the national Hungarian spirit was inaugurated. Ferenez Kazinczy (1759–1831) reformed the language, and George Bessenyei (1747–1811) wrote plays, whilst Rath started the first newspaper in Hungarian.

Since then Hungarian literature has developed considerably, but we can only mention a few names, such as Alex. Kisfaludy, Ferenez Kolcsey, and Arany, from among the numerous poets. Among fiction writers the following may be mentioned: Janos Erdelyi (1814–68), Michael Tompa (1817–68), Nicholas Josika (1794–1865), Jozsef Eötvös (1813–71), Sigismund von Kemény (1816–75), Maurice Jokai (1825–1904), Herczeg, and Sigismund Brody.—Cf. E. Reich, *Hungarian Literature.*

HUNGER, a craving for food. It is a feeling partly due to the distention of the muscular wall of the stomach, from which nervous impulses pass to the brain, since it may be relieved temporarily by the introduction into the stomach of material which is incapable of yielding any nutriment to the body. But it also arises from a condition of the system, since the introduction of nutriment into the blood, apart altogether from the stomach, will relieve it. This is also evident from the fact that hunger may be experienced even when the stomach is full of food, and when food is supplied in abundance, if some disease prevents the absorption of the nourishment, or quickly drains it from the blood. Hunger may be partially allayed by sleep or by the use of narcotics, tobacco, and alcohol, all of which tend to diminish the disintegration of tissue.

HUNGERFORD, market town of Berkshire. It stands on the River Kennet, 25½ miles from Reading, on the G.W. Rly. At Hocktide, the second Monday or Tuesday after Easter, an annual festival is held. The town has an agricultural trade and is a fishing centre. Pop. (1931), 2,784.

HUNINGUE (Ger. *Hüningen*; hu'ning-en), a town of France, in Upper Alsace, formerly fortified. It has a famous fish-breeding establishment. From 1871 to 1918 it was in German possession. Pop. 3,113.

HUNS (Lat. *Hunni, Chunni*), a nomadic and warlike people of Asia, of Mongolian race, part of whom entered Europe, probably in the fourth century after Christ, conquered the Alans, and drove the Goths out of Dacia. They continued to extend their dominion along the Danube till the time of Attila (A.D. 434), who, taking the whole Hunnish power into his hands, became the most powerful prince of his time. (*See* ATTILA.) His defeat near Châlons was the commencement of the decline of the power of the Huns, and within a generation after his death, in 453, the great Hunnish Empire had completely disappeared, and the race been absorbed amongst other barbarous peoples.

The term Huns was used by ancient and mediæval writers in a very vague way to indicate barbarous hordes invading Europe from the north-east. The Huns are described as a race of dark complexion with small black eyes, flat noses, and broad shoulders. During the European War the name Huns was commonly applied to soldiers of the German army, partly on account of their 'frightfulness,' and partly because in 1900 the ex-Kaiser thus addressed troops embarking at Bremershaven for China: "No quarter will be given, no prisoners will be taken. Let all who fall into your hands be at your mercy. Just as the Huns a thousand years ago, under the leadership of Attila, gained a reputation in virtue of which they still live in historical tradition, so may the name of Germany become known in such a manner in China that no Chinaman will ever again even dare to look askance at a German."—Cf. J. Hodgkin, *Italy and her Invaders.*

HUNSTANTON, English watering-place, in Norfolk, on the Wash, with fine sands, good bathing, golf-links, &c. Pop. (1931), 3,131.

HUNT, Alfred William, British landscape-painter, born at Liverpool 18th Nov., 1830, died 3rd May, 1896. Educated at Oxford, he became a Fellow of Corpus Christi College in 1858. In 1851 he wrote the Newdigate Prize poem, and in 1854 he exhibited a landscape at the Royal Academy. He excelled in water-colours, and in 1864 was elected a member of the Old Water Colour Society. Examples of his work are in the Tate Gallery, London, and in the Walker Art Gallery, Liverpool.

HUNT, James Henry Leigh, an English poet and essayist, born in 1784, died in 1859. He was educated at Christ's Hospital, where he attained some distinction, entered the office of his brother, an attorney, and afterwards obtained a situation in the War Office.

In 1808, in conjunction with his brother John, he started *The Examiner* newspaper, which soon became prominent for the fearlessness with which public matters were discussed. Ere long official resentment took shape in two prosecutions of the brothers, the second of which, occasioned by an article in the paper of 22nd March, 1812, reflecting on the character of the Prince Regent, resulted in the brothers being sentenced to pay a fine of £500 each, and to suffer two years' imprisonment. During his confinement Hunt wrote several works, amongst which are *The Feast of the Poets*, *The Descent of Liberty*, and *The Story of Rimini*.

In 1818 appeared *Foliage*, a collection of original poems and translations from Homer, Theocritus, Bion, &c.; and in 1819 *The Indicator* was started, a weekly journal on the model of *The Spectator*, which contained some of his best essays. In 1822 he proceeded to Italy, having received an invitation thither from Byron and Shelley, and, in conjunction with the former, carried on a newspaper called *The Liberal*; but it proved unsuccessful. On his return to England Hunt published *Recollections of Lord Byron and some of his Contemporaries* (2 vols., 1828), which provoked somewhat the indignation of the noble poet's friends.

Among his subsequent works may be mentioned: *A Legend of Florence*, a play represented with some success at Covent Garden in 1840; *Stories from the Italian Poets* (2 vols., 1846); *Men, Women, and Books* (1847); *A Jar of Honey from Mount Hybla* (1847); *The Town: its Memorable Characters and Events* (1848); *Autobiography* (3 vols., 1850); *Table Talk* (1850). In 1842 Mrs. Shelley settled an annuity of £120 upon Leigh Hunt, and in 1847 a Government pension of £200 a year was bestowed on him.—BIBLIOGRAPHY: C. T. Winchester, *A Group of English Essayists*; B. Miller, *Leigh Hunt's relations with Byron, Shelley, and Keats*.

HUNT, William Holman, English painter, born in 1827 at London, died 1910. He was trained in the Royal Academy school, and began to exhibit in 1846; and with Millais and Rossetti founded the Pre-Raphaelite Brotherhood. (*See* PRE-RAPHAELITE BROTHERHOOD.) In 1853 his *Claudio and Isabella* (now in the Tate Gallery) attracted public attention, followed next year by his first great success, *The Light of the World*, now at Keble College, Oxford.

In 1854 he made a journey to the East, the fruits of which are observable in the local colour and realistic detail of a long series of religious pictures including *The Scapegoat* (1856); *The Finding of the Saviour in the Temple* (1860); *The Shadow of the Cross* (1873); *Plains of Esdraelon* (1877); and *Triumph of the Innocents* (1885), now in the National Gallery. Among his genre paintings are: *Isabella and the Pot of Basil*, *The After-Glow*, *The Festival of St. Swithin*, *Mayday*, and *Magdalen Tower*. Towards the end of his life he received the Order of Merit. In 1905 he published *A History of Pre-Raphaelitism*.—BIBLIOGRAPHY: G. C. Williamson, *W. Holman Hunt*; T. L. Hare, *Leaders of English Pre-Raphaelites*.

HUNTER, Sir Archibald. British soldier. Born 6th Sept., 1856, he was educated at Glasgow Academy, and entered the army. In 1884 he went to Egypt, where he became associated with Kitchener. In 1895 he was given command of the Frontier Field Force. In 1898 he led a division at the Battle of the Atbara and was in command of the British division at Omdurman, being then made Governor of that place. He was knighted in 1898. In 1900-01 he commanded a division in S. Africa; in 1901–03 he was commander-in-chief in Scotland; and from 1904–09 he was in India, first at the head of an army corps and then of the southern army. From 1910–13 Hunter was Governor of Gibraltar. During the Great War he held high command at home until he retired in 1918. From 1918–22 he was Unionist M.P. for the Lancaster division.

HUNTER, John, surgeon and physiologist, was born at Long Calderwood, Lanarkshire, in 1728, died in 1793. He assisted his brother-in-law, a carpenter in Glasgow, for some time in his trade, but afterwards went as assistant to his brother William, a prosperous surgeon in London. In 1756 he was appointed house-surgeon at St. George's Hospital, and also lectured in his brother's school of anatomy. In 1760, his health needing a change of climate, he became staff-surgeon and went with the army to Portugal. Three years afterwards he returned to London, and, in 1768, was appointed surgeon to St. George's Hospital; in 1790 surgeon-general to the army, and inspector-general of hospitals.

Hunter contributed greatly to the high development of English surgery, as well as to the advance of anatomy and physiology. One of his chief works was his *Treatise on the Blood, Inflammation, and Gun-shot Wounds* (1794). His valuable museum of surgical and anatomical subjects was purchased by the Government and presented to the Royal College of Surgeons.—Cf. G. R. Mather, *Two Great Scotsmen, W. and J. Hunter*.

HUNTER, William, physician and anatomist, elder brother of the preceding, was born at Long Calderwood, Lanarkshire, in 1718, died in 1783. He studied at Glasgow with a view to entering the Church, but abandoned theology for medicine. In 1741 he went to London, where he became a member of the College of Surgeons; acquired a large practice in surgery and midwifery; was appointed accoucheur to the British Lying-in Hospital, and in 1764 physician-extraordinary to the queen; in 1767 a Fellow of the Royal Society; and in 1780 foreign associate of the Royal Medical Society of Paris.

In 1770 he established a theatre of anatomy for his own lectures and a splendid museum for his anatomical preparations, objects of natural history, pictures of ancient coins and medals, &c. He was the author of some important works, in particular the *Anatomy of the Human Gravid Uterus*, published in 1774. He bequeathed the whole of his splendid museum, valued at £150,000, to the University of Glasgow, with the sum of £8,000 in cash to be expended in a building for its reception, and a further sum of £500 per annum to bear the charges of its preservation.

HUNTING COG, an extra cog put into a pair of cog-wheels to prevent a pair of teeth coming into contact too frequently. For instance, if a cog-wheel A has 60 teeth and a cog-wheel B has 20, the same pair of teeth will come into contact after every revolution of A, or after every three revolutions of B. Also, after every three revolutions of B a particular tooth of A will come in contact with a particular tooth on B, and a particular tooth on B will come in contact in turn with three definite teeth on A. If now the number of teeth on A be increased from 60 to 61, the velocity ratio of the pair of wheels would scarcely be changed, but the same pair of teeth will now only come in contact after 20 revolutions of A or 61 revolutions of B, and each tooth on one wheel will now come in contact in turn with every tooth on the other wheel. This ensures even wearing of the teeth.

HUNTINGDON, Selina, Countess of, was born in 1707, died 17th June, 1791. She married, in 1728, the Earl of Huntingdon, became a widow in 1746, and, adopting the principles of the Methodists, was long considered, owing to her rank and fortune, as the head of the Calvinistic Methodists. The religious movement founded by Lady Huntingdon came to be known as the Countess of Huntingdon's Connection. She founded a college at Trevecca, in Wales, for the education of ministers, built numerous chapels, and contributed liberally to the support of the clergy. In 1792 the college was removed to Cheshunt and in 1905 to Cambridge.—BIBLIOGRAPHY: A. H. New, *The Coronet and the Cross*; Sarah Tytler, *The Countess of Huntingdon and her Circle.*

HUNTINGDON, a small inland county of England, surrounded by the counties of Northampton, Cambridge, and Bedford; area, 233,985 acres. The north-eastern portion of the county is included within the great Fen district, and is principally devoted to grazing. The soil is clayey and has been much improved in productiveness by scientific farming. Five-sixths of the total area is under crops and permanent pasture. Cattle-rearing, market-gardening, and in the Fen portion the cultivation of willows are amongst the principal employments. The manufactures are unimportant. The county returns one member to Parliament. Pop. (1931), 56,204.—The county town, **Huntingdon,** 59½ miles north by west of London, on the north bank of the Ouse, has breweries, brickworks, and carriage-works. Pop. (1931), 4,108.

HUNTINGTOWER, village of Perthshire. It is on the River Almond, 3 miles from Perth, and is famous for its castle. This was originally Ruthven Castle, and from it James VI was taken forcibly by the Earl of Gowrie and his associates in 1582. The name of the castle was then changed. Now partly a ruin, it is open to visitors. Huntingtower gives its name to a novel by John Buchan. The village has bleaching yards.

HUNTLY, a burgh and market town of Scotland, Aberdeenshire. It is an agricultural centre. The district around Huntly is called Strathbogie. Pop. (1931), 3,778.

HURA, a genus of tropical American plants, nat. ord. Euphorbiaceæ. *H. crepitans*, the sand-box tree, is remarkable for the loud report with which its seed-vessel bursts. It is a large branching tree with glossy poplar-like leaves, inconspicuous dioecious flowers, and large, furrowed, roundish fruits of the size of an orange.

HURLFORD, town of Ayrshire. Near Kilmarnock, it is situated on the Irvine, and is 389 miles from London by the L.M.S. Rly. There are coal mines near, and worsted is made. Pop. (1931), 4,696.

HURLINGHAM, district of London. It is in the borough of Fulham adjoining the Thames. In 1867 the club called the Hurlingham Club was formed here. It bought Hurlingham House and grounds, and was for some

time a centre of pigeon shooting. Later it took up polo, and is now the recognized authority on this game.

HURON, LAKE, one of the five lakes on the frontiers of the United States and Canada. It is the third in size, being 218 miles long north and south, and (including Georgian Bay) 180 miles broad at its widest part, with an area of about 23,010 sq. miles. It lies 578 feet above sea-level. The lake contains several thousand islands, varying in size from a few square feet to huge islands like the Great Manitoulin, which is about 107 miles long and from 4 to 25 miles wide, and is the only one inhabited. The waters are very clear and pure, abound in fish, and have a depth averaging from 800 to 1,000 feet.

HURONIAN ROCKS, in geology, a term first applied to certain rocks on the banks of Lake Huron, consisting of quartzite, with masses of chloritic schist. The Huronian series of North America are clearly of sedimentary origin; they are often penetrated by intrusive masses, and underlie the fossiliferous Cambrian strata unconformably. Below them is the great complex of crystalline rocks to which the term Archæan is now often restricted.

HURSLEY, village of Hampshire. It is 4 miles from Winchester. **Hursley Park,** long the seat of the Heathcote family, is the successor of the house in which Richard Cromwell lived. Pop. 937.

HURSTMONCEAUX, village of Sussex. It is 9 miles from Eastbourne. Its feudal castle, long a ruin, was restored in the 20th century. All Saints is an old church with memorials to the families of Fiennes, Dacre and Hare. Pop. 1,495.

HURST PARK, racecourse in Surrey. It is at Molesey Hurst on the Thames. Opposite to it, on the Middlesex side of the river, is Hampton.

HURSTPIERPOINT, village of Sussex. It is 9¾ miles from Brighton and 1¼ from Hassocks, its station on the S. Rly. Holy Trinity Church is a fine modern building. Here is St. John's College, a public school for boys. Pop. 3,200.

HUSBAND AND WIFE. Recent legislation in most countries has been in the direction of putting husband and wife on an equality, whereas formerly the wife to a great extent lost her separate status on marriage. Thus, for instance, by the English common law her personal property passed at once to her husband on marriage, though this might be obviated by special settlements. But the law no longer stands so, especially since the Act of 1882. By this statute a married woman can acquire, hold, and dispose of, by will or otherwise, property as if she were an unmarried woman, and may enter into any contract, and sue or be sued without the participation of her husband.

A woman carrying on a business separately from her husband is subject to the bankruptcy laws as if she were unmarried. Every married woman has, even against her husband, the same civil remedies, and also the same remedies by way of criminal proceedings for the protection and security of her own property, as if she were unmarried; but she cannot take criminal proceedings against her husband while they are living together. Generally a husband is not bound by the contracts of his wife unless they are made by his express or implied authority. *See* MARRIAGE; DIVORCE; ADULTERY; SETTLEMENT; WILL; INTESTACY.

HUS'KISSON, William, English statesman, born in 1770, died 15th Sept., 1830. In 1790 he was appointed secretary to Lord Gower, the British Ambassador at Paris, and in 1795 became Under-Secretary for War and the Colonies. In 1796 he became member of Parliament for Morpeth, and in 1804 Secretary of the Treasury in the Pitt administration. In 1814 he was appointed Chief Commissioner of Woods and Forests; he was returned for Liverpool in 1823, and made President of the Board of Trade. In 1827 he became Secretary of State for the Colonies, under Lord Goderich. He had now come to be a recognized authority on all questions of trade and commerce. In 1828 a misunderstanding with the Duke of Wellington, then at the head of the Cabinet, led to his withdrawing, along with other Tories, from the administration. He was accidentally killed at the opening of the Liverpool and Manchester Railway.

HUSS, or **HUS, John,** Bohemian religious reformer, born about 1373, burned alive 6th July, 1415. He studied at the University of Prague, took the degree of Master of Arts in 1396, and in 1398 began to lecture on theology and philosophy. In 1401 he was made dean of the faculty of philosophy, became the leader of the Bohemian in opposition to the German professors and academicians, and after the withdrawal of the latter to Leipzig, was made rector of the university (1409).

Since 1391 he had been acquainted with the writings of Wycliffe, and his denunciation of the Papal indulgences, of masses for the dead, and of auricular confession, alarmed Archbishop

Sbynko of Prague, who had 200 volumes of Wycliffe's writings burned (1410) in the archiepiscopal palace, and the preaching in Bohemian prohibited. Huss appealed to the Pope, John XXIII, who summoned him to appear at Rome. Huss refused to appear, and was in consequence excommunicated, and Prague laid under an interdict as long as Huss should remain in it. The people of Prague, however, stood by their preacher, and the Pope was compelled to acquiesce. But the quarrel broke out again when Huss and his friend Jerome publicly condemned the Papal indulgences granted for the crusade against Ladislaus of Naples. Huss was again excommunicated and Prague interdicted.

The reformer now retired to Hussinatz to the protection of his feudal lord, and here he wrote his books *On the Six Errors* and *On the Church*, in which he attacks transubstantiation, the belief in the Pope and the saints, the efficacy of the absolution of a vicious priest, unconditional obedience to earthly rulers, and simony, which was then extremely prevalent, and makes the Scriptures the only rule of matters of religion. The approbation with which these doctrines were received, both among the nobility and common people, increased the party of Huss in a great degree, and emboldened him to comply with the summons of the Council of Constance to defend his opinions before it. The Emperor Sigismund, by letters of safe conduct, became responsible for his personal safety; and John XXIII, after his arrival at Constance, 4th Nov., made promises to the same effect. Notwithstanding this, Huss was thrown into prison, 28th Nov., and after several public examinations, conducted with little regard to justice and the rights of the accused, he was sentenced to death on 6th July, 1415, and burned alive the same day, and his ashes thrown into the Rhine. *See* HUSSITES. —BIBLIOGRAPHY: Count Lützow, *Life and Times of Master J. Huss*; H. B. Workman, *The Age of Huss*; H. C. Lea, *History of the Inquisition of the Middle Ages*.

HUSSARS, the name given to certain regiments of light cavalry formerly known in the British service as light dragoons. The name *hussars* has its origin in Hungary, where troops of light cavalry known by that name and largely composed of petty Magyar landowners were employed in the imperial armies as scouts and foragers. It does not appear that these original hussars were considered of any great value as soldiers, and during the Thirty Years' War they were usually looked on as marauders and, if captured, slaughtered out of hand.

The full-dress uniform of British hussars is distinctive and effective, but in service dress there is little to distinguish an hussar regiment from any other. In the British service the first light dragoon regiment to be dressed and armed as hussars was the 7th, now the 7th (Queen's Own) Hussars, and the uniform selected was an adaptation of that in favour in Hungary. There the native hussar was accustomed to wear hanging from his left shoulder a short embroidered jacket or sleeved cloak. This, no doubt, was originally merely a convenient method of carrying an extra protection against the inclemency of the weather, but it also performed the no less useful duty of protecting the bridle arm to some extent from a sword cut. It is probable that when the English hussar went to Hungary for his fashions the original and obvious use of the garment had been lost sight of, and the dolman, as it was called, was retained merely as an ornament, and as such it was taken into use by our English hussars. Old prints of hussars invariably show this garment being worn, but it is now many years since its use has been discontinued. Other outstanding features of the hussar uniform are the head-dress or busby, embellished with a coloured flap or 'bag' on the right side, and carrying a stiff plume, usually of a different colour, in front. Officers' chargers carry a 'throat plume.'

Up to 1922 hussar regiments in the English army were: 3rd (King's Own) Hussars (1685), uniform, blue; collars, scarlet; busby-bag, garter blue; plume, white. 4th (Queen's Own) Hussars (1685), uniform, blue; busby-bag, yellow; plume, scarlet. 7th (Queen's Own) Hussars (1688), uniform, blue; busby-bag, scarlet; plume, white. 8th (King's Royal Irish) Hussars (1688), uniform, blue; busby-bag, scarlet; plume, red and white. 10th (Prince of Wales's Own Royal) Hussars (1715), uniform, blue; busby-bag, scarlet; plume, black and white. 11th (Prince Albert's Own) Hussars (1715), uniform, blue; overalls, crimson; busby-bag, crimson; plume, crimson and white. 13th Hussars (1715), uniform blue; collars, buff; busby-bag, buff; plume, white. 14th (King's) Hussars (1715), uniform, blue; busby-bag, yellow; plume, white. 15th (The King's) Hussars (1759), uniform, blue; busby-bag and plume, scarlet. 18th (Queen Mary's Own Royal) Hussars (1759), uniform, blue; busby-bag, blue; plume, scarlet and white. The 19th (Queen Alexandra's Own Royal) Hussars (1858)

and 20th Hussars (1858). In 1922, however, the following pairs of regiments were amalgamated to form one regiment each—13th–18th, 14th–20th and 15th–19th. In 1928 the 11th was converted into a cavalry armoured car regiment.

The height of recruits for hussars should be between 5 feet 4 inches and 5 feet 8 inches, and the age between eighteen and twenty-five, while the weight should be not more than 11 stone. Hussars are armed with sword and carbine. (The dates in brackets are those of the first raising of the regiment as horse or light dragoons.)

HUSSEIN, Ibn Ali, Grand Shereef of Mecca and first King of Hejaz, born in 1851. A scion of the family of the Katada, in which the Shereefate of Mecca has been vested since the twelfth century, he lived as a prisoner at Constantinople from 1890 to 1908. After the Turkish Revolution he was appointed Grand Shereef of Mecca by the Committee of Union and Progress. During the European War he proclaimed (in 1916) the independence of Arabia and joined the Allies against the Turks; organized the Arab forces, and placed the northern army under the command of his son, the Emir Feisul. In July, 1916, his army captured the port of Medina and assisted the Allies in defeating the Turks. Hussein was King of Hejaz from 1916 until his abdication in 1924. He died in June, 1931. His son Feisal was elected King of Iraq in Aug., 1921.

HUSSEIN KAMIL, Sultan of Egypt, born 20th Dec., 1853, died 9th Oct., 1917. A son of Ismail Pasha, he was educated in Paris, where he was on intimate terms with the family of Napoleon III. He returned to Egypt in 1870, held several important posts, but had to leave the country during the troubles of 1879, and lived in Italy. Returning to Egypt after the fall of Arabi Pasha, he became President of the Legislative Council in 1909. When Egypt was declared a British Protectorate in 1914, Hussein was appointed first Sultan of the country. He was succeeded in 1917 by his brother Fuad, born 1868. He was proclaimed king in 1922 on the termination of the Protectorate.

HUSSITES, the followers of John Huss. After the death of Huss, his adherents took up arms for the defence of their principles, and, under the leadership of Johann Ziska, captured Prague, fortified Mount Tabor, and repeatedly defeated the troops sent against them by the Emperor Sigismund, who had succeeded to the crown of Bohemia.

Ziska died in 1424, and was succeeded by Procopius, who also distinguished himself by many victories. The excesses of this party, however, who were called the *Taborites*, alienated the moderate Hussites, who called themselves *Calixtines*, and who finally united with the Catholics by the Compact of Prague in 1433 to acknowledge Sigismund as king, certain concessions, especially the use of the cup for the laity, having been made to them by the Council of Basel. The Taborites, thus weakened, were totally defeated at Bömischbrod on 31st May, 1434, and afterwards declined as a political party, finally becoming merged in the Bohemian Brethren. *See* BOHEMIA; BOHEMIAN BRETHREN.—BIBLIOGRAPHY: Count Lützow, *Life and Times of Master J. Huss*; Ernest Denis, *Huss et la guerre des Hussites*; J. E. Hutton, *A History of the Moravian Church.*

HUSTINGS (Scand. *hus*, house, and *thing*, meeting), (1) a name given to a court formerly held in many cities of England, as York, Winchester, Lincoln, but especially applied to the county court of the city of London held before the Lord Mayor, recorder, and sheriffs. (2) The platform from which candidates for seats in Parliament addressed the constituency on their nomination previous to the Ballot Act of 1872.

HUTCH'ESON, Francis, philosophical writer, born in Ireland in 1694, died in 1746. He studied at the University of Glasgow from 1710 to 1716, was licensed to preach, but set up a private academy in Dublin. In 1725 his celebrated *Inquiry into the Ideas of Beauty and Virtue* appeared, followed in 1728 by his *Treatise on the Passions*. In 1729 he was called to the chair of moral philosophy at Glasgow.

The main features of his philosophical teaching are the theory of a distinct moral sense or conscience peculiar to man, and his view of virtue as benevolence. Hutcheson's moral philosophy is strongly opposed to the empiricism of Locke, and in this respect he may be considered as the precursor of Reid and the Scottish school. In 1755 a *System of Moral Philosophy* was published at Glasgow by his son from his MSS.—Cf. James Martineau, *Types of Ethical Theory.*

HUTCH'INSON, John, an English officer of the Parliament, and Governor of Nottingham Castle during the great Civil War, was born at Nottingham in 1616, died in 1664. He studied at Cambridge, and afterwards went to London to study law. In 1638 he married Lucy, the daughter of Sir Allen Apsley. On the outbreak of the Civil War he joined the popular party,

and was appointed Governor of Nottingham Castle, which he defended against the Royalists with great skill and gallantry.

On the termination of the war he was returned to Parliament for his native town, and was a member of the high court of justiciary which condemned the king to death, but subsequently retired from public life because he disapproved of Cromwell's arbitrary conduct as ruler. After the Restoration Colonel Hutchinson was arrested and died in prison. His wife wrote a memoir of his life which is amongst the most valuable and interesting of its kind in English literature. The book was first published in 1806, and an edition by C. H. Firth appeared in 1885.

HUTHWAITE, urban district of Nottinghamshire. It is 3 miles from Mansfield and electric tramways link it with Sutton-in-Ashfield. It is a coal mining centre. Pop. (1931) 5,092.

HUTTEN, Ulrich von, a German knight, distinguished for the influence which his writings exercised upon the Reformation, was born at the family castle of Steckelberg on the Main, in 1488, died in 1523. He was educated at the famous monastic school of Fulda. Hutten led a wandering and unsettled life, sometimes appearing as the man of letters and controversialist, at other times as the soldier. His first attacks on the Roman Church were in connection with his defence of the persecuted Reuchlin, and with the issuing of the *Epistolæ Obscurorum Virorum* (q.v.).

In 1517 he was crowned laureate at Augsburg, and knighted by the emperor. A year or two after he retired to his paternal castle to write work after work, addressing the people, like Luther, in their native German, and denouncing the arrogance and corruption of Rome. The Roman authorities at length began to move against him, and he fled to the castle of his friend Franz von Sickingen, and from that again to Switzerland. He went to Basel, but was received coldly by Erasmus, who did not approve of his extreme measures. He died on the Island of Ufnau in the lake of Zürich.—BIBLIOGRAPHY: D. S. Jordan, *Ulrich von Hutten, Knight of the Order of Poets*; D. F. Strauss, *Ulrich von Hutten.*

HUTTON, James, Scottish geologist, born at Edinburgh in 1726, died in 1797. He studied at the university there and at Leyden, where he graduated as M.D. in 1749. Returning to Scotland, he settled for a time on a farm of his own in Berwickshire, but about 1768 went to Edinburgh, and devoted himself to scientific researches. His name is especially connected with a geological system, the chief features of which are his recognition of the similarity of processes in the past and present, and his theory of igneous fusion as accounting for most geological phenomena. Among his numerous works are *An Investigation of the Principles of Knowledge*; *Theory of Rain*; and *Theory of the Earth, with Proofs and Illustrations* (1795).

HUXLEY, Aldous Leonard. English novelist. Born 26th July, 1894, he was a son of Leonard Huxley, editor of the *Cornhill Magazine* and grandson of T. H. Huxley. He was educated at Eton and Balliol College, Oxford, and soon began to write for the Press. In 1916 a novel, *The Burning Wheel*, appeared and others followed. Perhaps the best known are *The Defeat of Youth, Chrome Yellow, Little Mexican, Two or Three Graces, Those Barren Leaves* and *Point Counterpoint*, and his essays, *Jesting Pilate* and *Music at Night.* In 1932 appeared *Brave New World.*

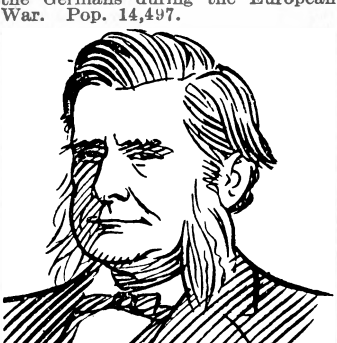
Huxley's elder brother, **Julian Sorell Huxley,** was born 22nd June, 1887, and educated at Eton and Oxford, becoming a scientist. He was in the United States 1912–16 and in 1919 was made Fellow and Lecturer at New College, Oxford. From 1925–27 he was professor of zoology at King's College, London, and from 1926–29 was Fullerian professor of physiology at the Royal Institution. Huxley has done extremely valuable work in biology, and has written a number of books including *Africa View*, and *What Dare I Think?* (1931).

HUXLEY, Thomas Henry, English biologist, born 4th May, 1825, died at Eastbourne 29th June, 1895. He graduated M.B. at the University of London in 1845, and entered the Royal Navy as assistant-surgeon in 1846. He sailed with H.M.S. *Rattlesnake* on a surveying expedition to Australasia, during which he sent a number of valuable papers to the Royal Society. He became professor of natural history at the School of Mines, Fullerian professor of physiology at the Royal Institution, and Hunterian professor at the Royal College of Surgeons. Subsequently he was president of the British Association meeting held at Liverpool in 1870, lord-rector of Aberdeen University in 1872, secretary of the Royal Society, substitute professor of natural history for Professor Wyville Thompson at Edinburgh in 1875 and 1876, and a member of various Royal Commissions on fisheries, vivisection, and universities, and Inspector of Salmon Fisheries. In 1885, however, he re-

signed most of his appointments on account of ill-health.

Works. Amongst his works are: *The Oceanic Hydrozoa* (1857); *On the Theory of the Vertebrate Skull*; *Man's Place in Nature* (1863); *On our Knowledge of the Causes of the Phenomena of Organic Nature*, a series of lectures to working-men delivered in 1862; *Elements of Comparative Anatomy* (1864); *Elementary Physiology* (1866); *Introduction to the Classification of Animals* (1869); *Lay Sermons, Addresses, and Reviews* (1870); *Critiques and Addresses* (1873); *American Addresses* (1877); *Physiography* (1877), *Anatomy of Invertebrate Animals* (1877); *The Crayfish* (1879) and *Science and Culture* (1882). Huxley was famous not only for his powers of research, but also for his gift of exposition, and his lectures and papers were models of accuracy and clearness.—BIBLIOGRAPHY: Leonard Huxley, *Life and Letters of Thomas Henry Huxley*; P. C. Mitchell, *Thomas Henry Huxley: a Sketch of his Life and Work*.

HUY (wē), a town of Belgium, province of and 18 miles south-west of Liége. It has a strongly-fortified citadel. The town was occupied by the Germans during the European War. Pop. 14,497.



Thomas Henry Huxley

HUYGENS (hoi'gens), **Christiaan,** Dutch mathematician and physicist, born in 1629, died at The Hague in 1695. He studied at Leyden, and at Breda, where he went through a course of civil law from 1646 to 1648. He made several journeys to Denmark, France, and England; in 1666 settled in Paris at the invitation of Colbert, and remained there till 1681, when he returned to Holland on account of his health.

Among his most important contributions to science are his investigations on the oscillations of the pendulum, and his *Systema Saturnium*, in

Christiaan Huygens, Dutch Mathematician

which he first proved that the ring completely surrounds the planet, and determined the inclination of its plane to that of the ecliptic. In 1690 he published important treatises on light and on weight. His *Traité de la lumière* was founded on the undulatory theory, but in consequence of the prevalence of the Newtonian theory it was long neglected till later researches revealed its value.

HUYSMANS, Joris Karl, French novelist of Dutch descent, born in Paris 5th Feb., 1848, died there on 13th May, 1907. Influenced by Zola and the Goncourts, Huysmans was at first a realist, but he soon abandoned sensual materialism (*En ménage*, 1881), and turned his attention to the study of spiritualism (*A rebours*, 1884), of decadence and Satanism (*Là-bas*, 1891). He then turned to the contemplation of religious mysticism in *En route* (1895), and finally to devout Catholicism in *La Cathédrale* (1898) and *L'Oblat* (1902). He also wrote *Les Foules de Lourdes* (1906).

HUYSUM (hoi'sŭm), **Jan van,** distinguished Dutch flower and fruit painter, born at Amsterdam in 1682, died there 1749. He worked at first with his father, Justus Huysum, a picture-dealer and painter, but afterwards set up on his own account, devoting himself, in emulation of de

Heem, to the painting of fruit and flowers. In this he attained great skill, his work being marked by brilliance of colour, exquisite finish, and decorative quality. He was extremely jealous of rivalry, and kept his methods of working and preparation of colours a deep secret. His landscapes are painted with great care and delicacy.

His brother **Justus** (born 1684) was a battle painter, and died at the age of twenty-two years. Another brother, **Jakob** (born 1687), copied his brother's flower and fruit pieces so perfectly that they have been mistaken for that master's work. In 1740 he died in England.

HUYTON, urban district of Lancashire called Huyton with Roby. Huyton is 5 miles from Liverpool and is a junction on the L.M.S. Rly. Near is Knowsley, the seat of the Earl of Derby. Pop. (1931), 5,198.

HWANG-HO, or **YELLOW RIVER,** a large river in China, the sources of

Striped Hyæna

which are in mountains in the Koko-Nor territory, north from Tibet. After a winding course of several hundred miles, it proceeds nearly due north to about lat. 41°; then east for nearly 200 miles, when it suddenly bends round, and flows directly south for about another 200 miles; then turns abruptly east, and flows in that direction till it reaches Lung-men-kau when it diverges to the north-east, and falls into the Gulf of Pe-chihli about lat. 37° 30′, and long. 118° 30′.

From the thirteenth century till 1852 the Hwang-Ho entered the sea in lat. 34°, south of the Peninsula of Shan-tung, but at the latter date it took its present course. Since then vast sums have been spent in watching and strengthening the banks of the river, which is constantly overflowing at some point. In the autumn of 1887 the whole body of the river burst its banks about 300 miles from its mouth, and flooded about one-sixth of the province of Honan, destroying towns and villages and causing a loss of life the lowest estimate of which is one million. Its length is estimated at about 2,600 miles. It derives its name from the vast quantities of yellow earth held in a state of solution by its waters.

HY'ACINTH, a genus of liliaceous bulbous plants, including about thirty species, amongst which the garden hyacinth (*Hyacinthus orientālis*) is celebrated for the innumerable varieties which culture has produced from it. It is a native of the Levant, and was first cultivated as a garden flower by the Dutch about the beginning of the sixteenth century. *See* BLUEBELL.

HY'ACINTH, or **JACINTH,** a variety of the mineral zircon (q.v.). Its prevailing colour is red, more or less tinged with yellow or brown. The name hyacinth is also given to varieties of the garnet cinnamon stone, the sapphire and topaz.

HYACINTHE, Pere, Charles Jean Marie Loyson, French Carmelite and eminent preacher, born at Orleans 10th March, 1827, died 8th Feb., 1912. Educated at Pau, and at the Theological Seminary of St. Sulpice, Paris, he was ordained a priest in 1851. He entered the order of Carmelite monks, and became one of the most famous preachers of his day, attracting vast crowds to the Madeleine, Notre Dame, and St. Sulpice. Suspended on a charge of indiscipline, for denouncing the abuses of the Church, he obtained a dispensation from his monastic vows, and became Abbé Loyson.

In 1870 he joined the Old Catholic movement, protesting against the infallibility of the Pope, and in 1872 he married an American lady in London. In 1879 he founded a Gallican church in Paris, where he served as rector for several years. His works include: *La Société civile dans ses rapports avec le Christianisme* (1867), *Programme de la réforme Catholique* (1879), *Mon Testament* (1893), and *Christianisme et Islamisme* (1895).

HY'ADES, a cluster of stars in the constellation Taurus, near the bright Aldebaran. The name, derived from the Greek verb, *hyein,* to rain, was given because the rainy season followed their rising with the sun.

HYÆNA, a digitigrade carnivorous mammal belonging to a family which is closely allied to the civet cats (Viverridæ). Habits gregarious. Feet four-toed, and armed with non-retractile claws. Tail short; ears large and pointed; eyes prominent. No scent-glands. Five upper and four lower grinding teeth on each side. Jaws and teeth unusually powerful, and adapted for crushing bones. They are nocturnal animals, extremely voracious, feeding chiefly on carrion, and thus

being of great utility in the countries where they live; to obtain dead bodies they will even dig up graves.

There are three recent genera. Crocuta includes the spotted hyæna (*C. maculata*) of South Africa, and Hyæna, native to Africa and Asia, comprises the striped and brown hyænas (*H. striata* and *H. brunnea*). The third genus, Proteles, sometimes referred to a special family, has but one species (*P. cristata*), the South African aard wolf, an aberrant maned form, with five toes on the fore foot and comparatively feeble teeth. In addition to carrion, it feeds on insects, especially termites (white ants). The extinct five-toed Ictitherium links hyænas with civet-cats. The cave hyæna, common in Europe (including Britain) during prehistoric times, is hardly to be distinguished from the spotted form, but was formerly considered a distinct species (*Hyæna spelæa*).

HY'ALITE, a pellucid variety of opal, appearing in mammillated forms in the cavities of lavas. *See* OPAL.

HYBRID, the offspring of two organisms belonging to different species (species hybrid), or more rarely to different genera (genus hybrid). The term is sometimes extended to a cross between two varieties or races of the same species, but to this the name *mongrel* is more properly applied. It is, however, only a case of degree, for varieties must be regarded as species in the making. A further difficulty arises from the fact that in some cases, particularly among plants, the distinction between species and varieties is far from clear, e.g. in willows, hawkweeds, and brambles. Hybrids are typically sterile, as illustrated by the genus hybrids produced by crossing pheasants and fowls, or the species hybrids (mules), which result from the mating of horses with asses or zebras. Mongrels, on the other hand, are particularly fertile, e.g. the numerous races of domestic cattle, dogs, and pigeons. The characters of mongrels are largely intelligible in the light of Mendelian principles (*see* MENDELISM), which doubtless also apply to hybrids, though here our knowledge is very incomplete.

The results of crossing are extremely varied, and fall into five chief groups. (1) Hybrids which are intermediate between the parents, e.g. mulattoes, crosses between finch and canary. (2) Hybrids possessing paternal and maternal characters side by side, not blended, e.g. piebalds, many pheasant crosses. (3) Hybrids which revert to an ancestral type, e.g. some pigeon crosses closely resembling the wild rock-dove, which is believed to represent the original stock. (4) Hybrids which differ from both parents, e.g. Andalusian fowls. (5) Hybrids which, in a given character, resemble one parent, e.g. most Mendelian crosses.

Hybrids and mongrels occur in nature more commonly than is supposed, but the most familiar cases have been produced artificially by plant-breeders and animal-breeders. The first recorded plant hybrid was raised in England by Fairchild, who crossed two species of pinks (*Dianthus caryophyllus* and *D. barbatus*) in 1717. Kölreuter was the first to hybridize plants on a large scale, his first hybrid (between *Nicotiana rustica* and *N. paniculata*) flowering in 1761. A great deal of plant hybridizing has been done of late years, mostly for the purpose of producing improved races of various crops, such as wheat immune against rust, and the bulk of this work has been on Mendelian lines.

Very interesting and practically valuable results have also been attained by crossing different kinds of fruit-yielding plants. The most familiar case is that of the loganberry, a hybrid between blackberry and raspberry, named after Judge Logan, who originated it in California. The thwarnord range of citrus-growing in the United States has been extended by crossing the sweet orange (*Citrus aurantiaca*) with a hardier Japanese species (*C. tirfoliata*), the result being a cold-resisting hybrid. On the other hand, the southern range of profitable pear-growing in the States has been much extended by the introduction of the Kieffer pear, a cross between the common species (*Pyrus communis*) and *P. sinensis*, which is drought-resisting.

Species hybrids among animals are usually of little economic value, though the common mule is a notable exception, and zebra mules, hybrids between horse and zebra, seem likely to have a future, for they are more docile than the ordinary kind while capable of the same sort of work. The mongrel races of domestic cattle, sheep, pigs, poultry, &c., are being continually improved by crossing, and Mendelian principles throw much light on directions which it is profitable to pursue.—BIBLIOGRAPHY: Charles Darwin, *Variations of Animals and Plants under Domestication*; André Suchetet, *Des Hybrides à l'état sauvage*; W. Bateson, *Mendel's Principles of Heredity*; Cossar Ewart, *The Penycuik Experiments*.

HYDATHODE, in botany, a pore or gland for the secretion of water or other liquid. These structures are frequently present on leaves, and much of the so-called 'dew' seen on

grass, &c., in the early morning is actually the liquid exuded from such organs, which are generally most active at night.

HYDE, a town of England (municipal borough), in Cheshire, 7½ miles E.S.E. of Manchester, giving name to a parliamentary division of the county; with cotton mills, hat factories, coal-mines, iron-foundries, and engineering works. Pop. (1931), 32,066.

HYDE, or **HIDE,** a measure of land, frequently mentioned in *Domesday Book* and in old English charters, and variously estimated as equivalent to 60, 80, and 100 acres—a fact which

Hyder Ali, Indian ruler and commander

may be accounted for on the supposition that the quantity was always determined by local usage. It was such a portion of land as might be ploughed with one plough. The hyde at present is reckoned at 100 acres.

HYDE PARK, a London park containing about 400 acres, and having on the west Kensington Gardens. Hyde Park derives its name from Hyde Manor, which belonged to the abbey of Westminster, and it became the property of the Crown on the dissolution of the monasteries in the reign of Henry VIII. It abounds with fine trees, and is the great fashionable promenade and public lounge of western London. It contains the Rotten Row, a special roadway reserved for equestrians; the Serpentine, a large sheet of ornamental water, much frequented in summer for bathing, and during frosts for skating; and the Albert Memorial, a structure in memory of the Prince Consort. In 1851 the first great international exhibition was held in Hyde Park, and the exhibition buildings, made of glass and iron, were afterwards re-erected at Sydenham as the Crystal Palace (q.v.).—Cf. Mrs. A. Tweedie, *Hyde Park: its History and Romance.*

HYDERABAD, or **HAIDARABAD** (hī-dar-ā-bād'), a state of India, which comprehends the greater part of that central plateau of Southern India known as the Deccan, and is in possession of a Mahommedan prince, the Nizam; area, 82,698 sq. miles, exclusive of the Berar or Hyderabad Assigned Districts under British administration. The country is intersected or bounded by the Godavery, Kistnah, and their tributaries. The soil is fertile, though much good land is not yet brought under cultivation. The chief products are rice, wheat, maize, sugar-cane, tobacco, cotton, indigo, fruits, and timber. Pop. (1931), 14,436,148. The ruler of Hyderabad belongs to a dynasty founded by Asaf Jah, a distinguished soldier, whom the Emperor Aurangzib made Viceroy of the Deccan in 1713, with the title of Nizam or Regulator. Sir Usman Ali Khan, the present Nizam, came to the throne in 1911.

HYDERABAD, the capital of the above state, is situated on the River Musi, at an elevation of 1,672 feet above the sea. It is surrounded by a stone wall flanked with bastions, forming an irregular quadrangle about 2¾ miles long upon the river and 2 miles broad. Amongst the chief buildings are the extensive palace of the Nizam; the British residency; the Char Minar, or Four Minarets, built about 1590 as a Mahommedan college, but now used for warehouses; the Jama Masjid, or cathedral mosque, designed after the one at Mecca. There are manufactures of silks, trinkets, and turbans. In 1908 about 18,000 houses were destroyed by floods. Pop. (1931), 466,894.

HYDERABAD, or **HAIDARABAD,** a town of India, capital of Hyderabad district, Sind. It is situated on a rocky eminence about 3 miles from the eastern bank of the Indus. The fort contains the arsenal of the province of Sind and the palace of the Emirs. The principal manufactures are arms, silks, cottons, and lacquered ware. Pop. (1931), 81,838.—The district has an area of 9,030 sq. miles; the pop. is 990,502.

HYDER ALI, Indian ruler and commander, born in 1728, died in 1782.

He was the son of a general in the service of the Rajah of Mysore. By his military talents he became the actual ruler of Mysore, and in 1762 deposed Kandih Rao, and had himself chosen Rajah. He encouraged agriculture and commerce, reorganized the army, and so greatly extended his dominions that in 1776 they contained 84,000 sq. miles, and afforded an immense revenue.

In 1780 he formed an alliance with the Mahrattas against the English, took Arcot, but was defeated by Sir Eyre Coote, 1st June, 1781. The Mahrattas now joining in a league against him, he carried on a disadvantageous war, during the continuance of which he died. He was succeeded by his son, Tippoo Sahib. —Cf. L. B. Bowring, *Haider Ali and Tipú Sultan* (Rulers of India Series).

HYDNACEÆ, a family of Basidiomycetous Fungi, distinguished by the hymenium being disposed on tooth- or spine-like projections of the fruit-body. The chief genus is Hydnum; *H. repandum* is edible.

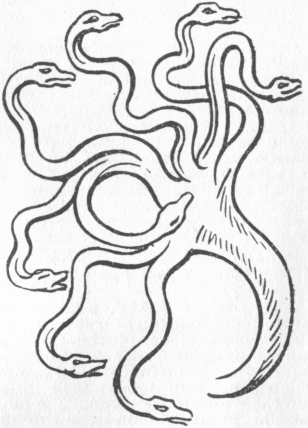
HYDRA, in Greek mythology, a celebrated monster which infested the neighbourhood of Lake Perna in the Peloponnesus. Some accounts give it a hundred heads, others fifty, others nine. As soon as one of these heads was cut off, two immediately grew up if the wound was not stopped by fire. It was one of the labours of Heracles to destroy this monster, and this he effected with the assistance of Iolaus, who applied a burning iron to the wounds as soon as one head was cut off. *See* HERACLES.

HYDRA, an island of Greece, on the east coast of the Morea; length, 11 miles; breadth, about 3 miles. Its surface, though not very elevated (highest point 1,939 feet), is almost entirely composed of bare sterile rocks; and the inhabitants, most of whom live in the town of Hydra, on the north-western shore, are engaged in trade and commerce. During the War of Independence the security which the island afforded raised its population for a time to 40,000; and the Hydriotes, with their fleet, played an important part in the struggle. Pop. of island, 7,000, almost all concentrated in the town of Hydra.

HYDRANGEA (hī-dran'jē-a), a genus of shrubs or herbs of the nat. ord. Saxifragaceæ, containing about thirty-three species, natives of Asia and America. The garden hydrangea (*H. ortensis*) is a native of China, and was introduced into Britain by Sir J. Banks in 1790.

HYDRATE, a term used in chemistry to denote the crystalline substances obtained by dissolving many substances in water, and then evaporating the water. These crystalline substances have definite physical properties distinct from those of the original substance, and usually a definite crystalline form.

The water with which they unite is easily lost, either by exposure to ordinary temperature or by the application of heat. Thus, chlorine gas, if dissolved in water and the solution cooled to 0° C., deposits yellow crystals of chlorine hydrate, $Cl_2 8H_2O$. Anhydrous copper sulphate, $CuSO_4$, if dissolved in water, yields a blue solution, and if the solution be evaporated, blue crystals of hydrated



Hydra, from marble at Naples

copper sulphate, $CuSO_4 5H_2O$, separate.

Many inorganic salts combine with water in this way, and give crystalline hydrates belonging to a different crystalline system, and often of a different colour. Copper sulphate is white, and crystallizes in small needles, whereas hydrated copper sulphate is deep blue, and crystallizes in large tabular crystals belonging to the triclinic system.

Cobalt chloride, $CoCl_2$, has a blue tint, but hydrated cobalt chloride, $CoCl_2 \cdot 6HO_2$, is red in colour. Sodium carbonate, Na_2CO_3 is a white powder; hydrated sodium carbonate, washing soda, crystallizes in large transparent crystals, $Na_2CO_3\ 10H_2O$. These hydrates show the same chemical reactions in solution as the anhydros salts.

HYDRAULIC CEMENT, cement which will set under water and re-

main, after setting, unaffected by the presence of the water. The term Portland cement is applied to this substance because of the resemblance of the material after setting to Portland stone.

It consists essentially of a mixture of about 75 per cent. chalk and the remainder clay, ground together to an extreme degree of fineness. The mixture is passed into a rotary kiln, where the temperature is sufficiently high (about 2,800° F.) to permit its union and the formation of a clinker, which is afterwards ground to the fineness of flour. The preparation and physical properties of cement are defined in the British Standard Specifications (No. 12; revised in 1915 and 1925), issued by the Engineering Standards Committee.

Certain natural cements possessing the hydraulic property of genuine Portland cement, but of low specific gravity and strength, and of variable character when set, are imported from Belgium. Portland cement is usually tested for tensile strength, both neat cement and cement-sand mixtures, in the form of briquettes, which are broken in special testing machines in which the load can be applied at a steady and definite rate. *See* CONCRETE; REINFORCED CONCRETE.

HYDRAUL'IC CRANE. *See* HYDRAULICS AND HYDRAULIC MACHINERY.

HYDRAULIC MAIN, a large horizontal pipe, half-full of water, used in a gas-works. The products of distillation are brought from the retorts into the hydraulic main by a 'dip-pipe' which dips from 1 inch to 3 inches into the water in the main. The more volatile products condense in this main, and are drawn off into the 'tar-well.' *See* GAS MANUFACTURE.

HYDRAULIC RAM. *See* HYDRAULICS AND HYDRAULIC MACHINERY; PUMPS.

HYDRAULICS AND HYDRAULIC MACHINERY. The internal motion in a mass of water may be of two kinds, steady *stream line* motion, in which the motion at a fixed point remains steady and continuous, or else unsteady *eddy* motion, where the motion at any point varies according to no definite law. In steady motion, the stream lines along which the water may be supposed to flow become fixed, as may be shown by the introduction of thin streams of colouring fluid into the mass in motion: the coloured stream line thus formed will appear motionless.

If the motion at any time changes to unsteady motion, the coloured line breaks up into multitudinous eddies and is almost instantaneously diffused throughout the liquid. Solid boundaries of a stream of water and the curvature of the path have a great effect in determining the steadiness or otherwise of the flow. Converging boundaries (as in the nozzle of a fire hose) and curving motion with the velocity greatest at the inside of the curve (as in the impact of a steady jet of water on to a plane surface, or the efflux of a jet from a sharp-edged orifice in the wall of a tank) tend to steady motion.

Water in motion possesses energy in virtue of its velocity, its pressure, and its height, these giving it kinetic energy, pressure energy, and potential energy. Thus water in motion with velocity v feet per second, pressure p lb. per square foot at height Z feet above some datum has a total energy of $\frac{v_2}{2g} + \frac{p}{w} + Z$ foot-lb. per pound, w being the weight per cubic foot of water.

In the stream line motion, where there is no loss of energy due to wall friction or eddy formation, *Bernoulli's Theorem* states that the total energy remains constant, i.e. $\frac{v_2}{2g} + \frac{p}{w} + Z$ is constant from one point to another along a stream line. The use of this equation enables the velocity of efflux from an orifice to be calculated. With a tank containing a small orifice h feet below the surface, the water issues from the orifice in a jet which decreases in section until at a point called the *vena contracta* the jet becomes parallel. The vena contracta occurs (in the case of a small circular orifice) at a distance from the orifice equal to about one-half the diameter of the jet.

Comparing the energy of the water at the surface of the tank with the energy of the water in the jet at the vena contracta, at the surface the pressure head and velocity head are both zero if atmospheric pressure is taken as datum, and the potential energy is h taking the level of the orifice as datum, whereas at the jet the potential energy and pressure energy are both zero, and the energy is wholly kinetic.

This being so, the kinetic energy at the jet is equal to the potential energy due to height h, that is to say, the velocity of efflux will be the same as if the particles of water had fallen freely through h feet under the action of gravity. That this is so is shown by the fact that a vertical jet of water rises very approximately to the free level in the vessel from which it was supplied.

If the stream lines are curved, the pressure varies from one stream line

to another across the stream lines, and the change of pressure may be determined from the fact that it has to be sufficient to balance the centrifugal forces acting on the water which is following a curved path. This

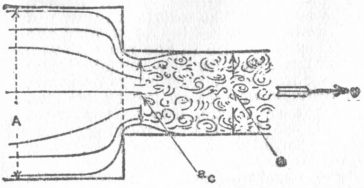


Fig. 1, Sudden contraction of area of stream, A, Larger stream area, *a*, Smaller stream area, *ac*, vena contracta.

change of pressure occurs, therefore, in *vortices*, the pressure increasing from the centre radially outwards; at *sharp-edged orifices*, where the issuing jet has curved boundaries for a short distance before it becomes parallel, and where the pressure is greater than atmospheric within the jet; at the buckets of a *Pelton wheel* (*see* TURBINES, WATER) where the jet is forced round and back upon itself, the pressure being atmospheric at the inside of the curved jet, while the pressure at the outside surface of the jet serves to force the bucket forward and so drive the wheel.

In practice there is always a loss of total head along a mass of flowing water caused (1) by frictional resistances between the boundaries confining the water, as in flow along a pipe; (2) losses due to formation of eddies which occur when the cross-section of a stream is suddenly enlarged, as when water flows past a gate-valve in a pipe line, or round a sharp bend in the pipe, in which case a vena contracta is formed on passing the bend, with a subsequent enlargement as the pipe is filled.

The losses of head in flow through a pipe line form an important factor in the problem of determining the minimum size of pipe which shall be capable of discharging a given quantity of water per minute from a reservoir situated at a considerable distance from the power-station or water-works which it supplies. Commencing at the reservoir end of the pipe there is loss of head due to friction and eddy formation at the entrance to the pipe, to friction in the pipe itself, and at valves and sluices, at all elbows and deviations from the straight, at pipe junctions, at sudden changes in area of the pipe, and finally at exit, due to rejection of the kinetic energy of the flow.

In each case the losses are approximately proportional to the square of the velocity, so that the total loss of head between entrance and exit of

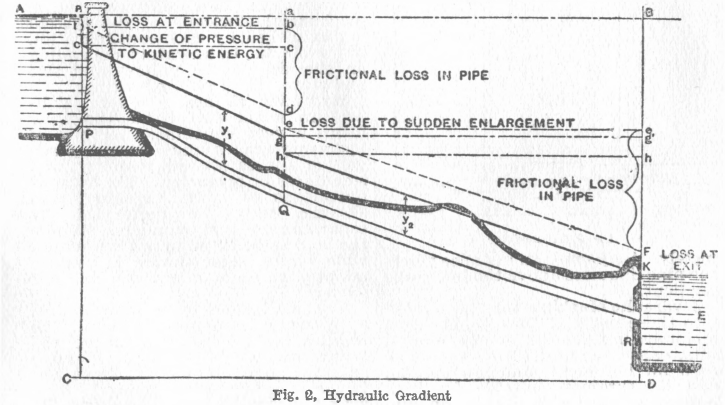

LOSS AT ENTRANCE
CHANGE OF PRESSURE TO KINETIC ENERGY
FRICTIONAL LOSS IN PIPE
LOSS DUE TO SUDDEN ENLARGEMENT
FRICTIONAL LOSS IN PIPE
LOSS AT EXIT

Fig. 2, Hydraulic Gradient

pipe would be Fv^2, F being a factor determined from the particular conditions. Hence if a pipe connects two reservoirs, the difference of head between their free surfaces must be Fv^2 in order that the pipe may run full with velocity *v*.

If in fig. 2 a horizontal line AB be drawn through the upper free surface, and if ordinates be drawn vertically downwards from AB representing to scale the total loss of pressure energy per pound of water from the pipe entrance to the particular point con-

sidered, the ends of the ordinates will be on a curve called the *hydraulic gradient* for the pipe line. It follows that the pressure energy at all points on the hydraulic gradient is zero, so that the pressure in the pipe at any point will be measured by the vertical distance y^1, y^2, &c., of that point below the gradient. If at any point the pipe line rises above the gradient the pressure becomes less than atmospheric, and any leakage here would allow air to be drawn in, with a possible stoppage of flow. If the pipe rises above the gradient by a distance equal to the barometric height, 34 feet, flow will of necessity stop completely. A *siphon* is an instance where the pipe line rises above the hydraulic gradient.

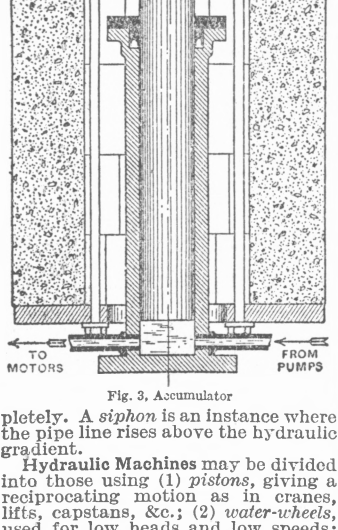


Fig. 3. Accumulator

Hydraulic Machines may be divided into those using (1) *pistons*, giving a reciprocating motion as in cranes, lifts, capstans, &c.; (2) *water-wheels*, used for low heads and low speeds; and (3) *turbines*, suitable for high heads and high speed of rotation, and capable of close speed regulation.

Where pressure water is required, as in towns, for transmission to various hydraulic machines, it may be produced from a steam-engine driving a reciprocating plunger pump by which water taken from a low-pressure supply is forced along suitable mains under pressures varying from 700 to 1,600 lb. per sq. inch in different localities

Hydraulic Accumulators. The delivery from a reciprocating pump is not uniform, and it is generally necessary to have some reserve of energy to meet a sudden or abnormal demand, so that pressure energy is often stored by means of an accumulator; this is placed between the pump and the supply main. It consists essentially of a vertical cylinder fitted with a weighted ram, the weight and area of this being adjusted so as to give the required pressure in the mains. The weighting material is usually pig-iron or iron slag. Care must be taken to prevent dangerous inertia shocks, which may occur, due to the great inertia of the heavy moving parts during rapid discharge of water along the mains.

For naval purposes where hydraulic machinery is in general use for training heavy guns and rotating turrets, the accumulator loaded with a mass of iron is obviously inadmissible, and its place is taken by a steam accumulator in which boiler steam is admitted to the upper side of a piston to whose under side the accumulator ram is fixed.

Hydraulic Jigger. This machine multiplies the motion of a short-stroke hydraulic ram by passing its wire rope round a series of pulleys arranged in two sheaves. The mechanical efficiency of the system is diminished by each multiplication of the stroke, to an extent depending on the size of the pulleys and size and state of the pulley bearings.

Hydraulic Cranes. Where high-pressure water is available, the *jigger* forms a very convenient method of operating cranes and has many advantages in safety, adaptability, and steadiness of operation. The various operations of lifting, racking, and slewing, may be performed by separate rams and cylinders. Where the load to be lifted may vary within wide limits, some device is usually adopted to economize water at light loads.

For small cranes up to about 2 tons, a telescopic ram may be used, the smaller portion working inside the larger, which itself works in the pressure cylinder. For light loads the larger is held stationary by locking gear, the smaller ram then doing the lifting. For heavy loads the two rams work together as one. Jiggers are used to work cranes, from the small wall crane in a workshop to the 250-ton Goliath cranes used in docks.

For work at docks luffing or variable rake cranes are most suitable, whereby parts of the ship at different distances from the crane centre may be reached. The crane may be mounted on a high pedestal, movable on rails in a direction parallel to the dock wall, so that the jib clears all obstructions.

Hydraulic Lifts. Hydraulic trans-

mission is particularly suitable for use in lifts and hoists, where the motion is intermittent and the speed low. There are several modifications of the simple *direct-acting* or of the *suspended* type. The former consists of a hydraulic cylinder sunk vertically in the ground, of length slightly greater than the maximum travel of the lift, and fitted with a ram which carries the lift cage direct. Pressure water is admitted below the ram and thus raises the cage. The sectional area of the ram must be sufficient to support the load it carries without buckling, and this area is generally so large that the pressure per square inch necessary to raise the load is fairly low, even when an allowance is made for the extra pressure required to overcome friction, and to give an acceleration at starting.

For small heights and rough work this type is well suited. For higher lifts, where the weight of ram and cage forms a large proportion of the whole load to be lifted, this weight must be balanced for efficient working. In addition, as the lift rises, the volume of water displaced by the ram diminishes, and so the effective weight of the ram increases. This variation becomes of less importance as the working pressure increases.

To overcome these difficulties the ram and the cage may be balanced by a weight attached to the cage by chains passing over a series of pulleys at the top of the lift shaft. As the lift rises, the length of chain on the balance weight side of the pulleys increases, and this may be made to balance the increasing effective weight of the ram by making the chain of a weight per foot run equal to half the weight per foot run of the column of water displaced by the ram. This method detracts from the otherwise essential safeness of this type of lift, since a fracture of the ram would cause the cage to run against the top of the shaft.

A second device is that of the balance cylinder, in which the weight

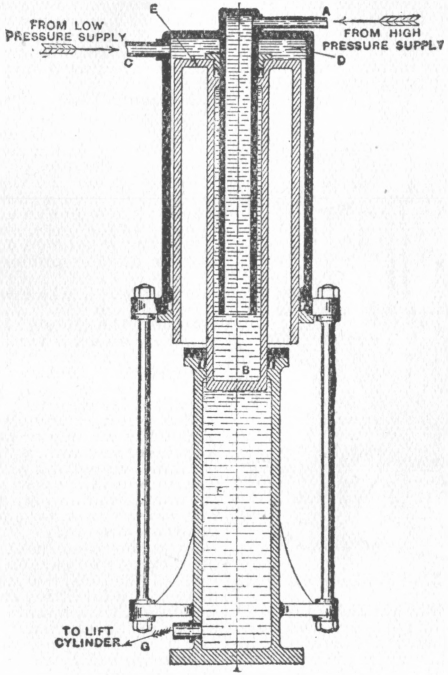


Fig. 4, Balance Cylinder for Hydraulic Lift

of the ram and cage may be balanced by a low water pressure produced by forcing water from a separate cylinder into the lift cylinder. The water is forced in by movement of a hollow piston, which may be weighted so as to balance only sufficient of the weight of the cage as to allow the cage to descend with reasonable rapidity on the down stroke, even when the cage is empty. Water from a high-pressure supply may then be admitted into the hollow piston, giving the additional force required to lift the cage and load.

The second type of lift—the *suspended* type—is manipulated from a hydraulic ram having a comparatively

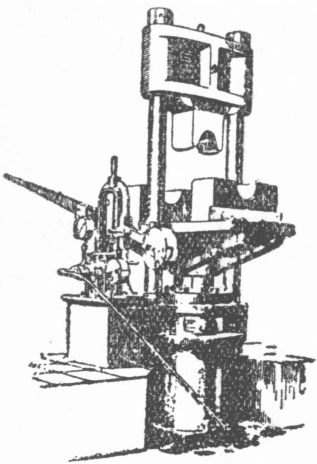


Fig. 5, Hydraulic Pipe-bending Press

short stroke. The requisite travel in the wire rope or ropes by which the cage is suspended is obtained by multiplying this by a jigger. The weight of the cage may be balanced by hanging weights, the varying immersion of the ram being unimportant in this case. As the cage of a suspended lift rises, the load on the cage side of the supporting pulley varies with the amount of suspending rope between pulley and cage. This may be counter-balanced by hanging from the under side of the cage a chain, the other end of which is attached to a point half-way up the lift shaft. Then at the top of its travel the cage is weighted down by the chain, whilst at the bottom of its travel the chain adds no weight to the cage.

The suspension system has certain advantages in virtue of the cheapness of construction of the shorter ram and cylinder, and does not necessitate the provision of a deep well below the lift shaft. Its drawbacks are due to the inefficiency of the multiplying jigger and to the serious effects which may follow the rupture of a wire rope; but adequate safety catches and brakes should render the system quite safe. The speed of hoisting may be as great as convenient, ranging from 2 feet per second for passenger hoists to 6 feet per second for warehouse hoists. In modern American practice speeds of 8 to 10 feet per second are occasionally used for express passenger lifts.

Hydraulic Press. The many types of hydraulic presses, as used for cotton baling, boiler-plate flanging, cartridge-case drawing, and heavy forging, all use the principle of the *Bramah hydraulic press*. In this press water is forced by means of a small pump, whose plunger has an area a, into the cylinder of the press, whose area is A. Neglecting friction, a force P on the smaller plunger produces a pressure intensity of $\frac{P}{a}$, which is transmitted through the liquid to the press cylinder, giving a force on the press plunger of $\frac{PA}{a}$, which may be made very large if A is large.

The ordinary simple *baling press* consists of a table or bed containing a cylinder and ram, with two or four columns supporting the fixed head. The ram head fits into and forces up the movable table, called the follower, between which and the press head the goods are pressed.

In a machine used for flanging operations, and capable of exerting a force of 420 tons, two small rams may be installed for lifting the head on the up stroke, the pressure for the down stroke being applied by one central and two side rams, pressure water being supplied to these in succession as additional force is required. During the idle part of the down stroke special valves allow water from the exhaust pipe to refill the space vacated by the falling rams. Full pressure only being required, probably, for the last 10 per cent or 20 per cent of the full stroke, one or two of the rams will remain idle for a considerable proportion of the stroke, thus economizing in quantity of pressure water used.

In the production of heavy forgings from large ingots of mild steel, the hydraulic *forging press* is gradually supplanting the steam hammer. With the latter the outer layers of the

forging absorb most of the energy of the blows, leaving the interior practically unaffected. The hydraulic press gives a slow and powerful compression which results in a more homogeneous structure, since every part of the ingot is more equally worked.

This type of press may be worked with or without a hydraulic accumulator; if without, a low-pressure water-supply at about 200 to 300 lb. per square inch is necessary, and during the idle part of the stroke this follows up the ram, the connecting pipe to a high-pressure pump being kept full in the meantime. When pressure is required the low-pressure supply is cut off and the high-pressure pump is worked, no valves being necessary, as the ram simply follows the motion of the pump plunger.

A type of forging press working in connection with an accumulator has the press fitted with a differential ram having diameters of 21 inches and 36 inches and supplied with water at 600 atmospheres. By using each cylinder separately or the two in combination, three powers having the approximate ratio 1: 2: 3 may be obtained, with an effective force varying from 1,300 tons to 4,040 tons. During the working portion of the stroke of a hydraulic press the ram velocity is required to be only very slow, so that the diameters of the supply pipes may be small without appreciable loss of head. A ratio of ram diameter to pipe diameter of about 12 to 1 is usually adopted.

Water-wheel. This in general is only suitable for small powers and low heads and where close speed regulation is not essential. Its efficiency is greatly affected by a variation in the supply and in the available head. Its size and weight are great in proportion to the power developed, and the speed of rotation is slow. Three types are used differing in the point of admission of the water. In the *overshot wheel* the water enters near the highest point of the wheel into a series of buckets in the periphery, and drives the wheel by the weight of the falling water.

Breast wheels are of a similar type, but the water is admitted into the buckets at some point near the level of the wheel axle. For heads of less than 3 feet the *undershot wheel* is used, in which the flowing water impinges on to radial vanes, driving the wheel by giving up the kinetic energy of the moving water. *See* BREAST WHEEL; OVERSHOT WHEEL; UNDERSHOT WHEEL; TURBINE; HYDRO-ELECTRIC ENGINEERING.—BIBLIOGRAPHY: A. H. Gibson, *Hydraulics*; F. C. Lea, *Hydraulics*.

HYDRAZINE, N_2H_4, a substance which was known in the form of its compounds long before the pure substance was isolated. Free hydrazine is difficult to prepare, as the hydrate is stable and is formed whenever the base is liberated in presence of moisture. It was first isolated by Lobry de Bruyn in 1895. It is a colourless fuming liquid boiling at 113° C., and is a strong reducing agent. The salts of the substance and the hydrate are comparatively easily prepared.

The hydrate $N_2H_4H_2O$ is a strongly basic substance resembling ammonia, but having reducing properties. Like ammonia, hydrazine forms a series of crystalline salts with acids; for example, hydrazine sulphate, $N_2H_4.H_2SO_4$, and hydrazine chloride, N_2H_42HCl. In the form of its salts hydrazine is used as a reducing agent, and also as a means of isolating ketones and aldehydes, with which it combines, giving crystalline compounds, the hydrazones. Phenylhydrazine, $C_6H_5NH \cdot NH_2$, the phenyl derivative of hydrazine, reacts readily with certain sugars forming osazones, and by means of these crystalline compounds many of the sugars have been synthesized.

HY'DRIDE, in chemistry, a compound of hydrogen with any other element, e.g. SiH_4 silicon hydride, Cu_2H_2 cuprous hydride.

HYDROCARBONS, the name given to the compounds of carbon with hydrogen. These are exceedingly numerous and are divided into various groups. Each group forms a homologous series where there is an increase of 1 carbon and 2 hydrogen atoms between each member and the succeeding one. Thus, in the paraffin series the first member has formula CH_4, the next member C_2H_6, the next C_3H_8, and so on.

Each series exhibits characteristic general reactions which distinguish it from every other series of hydrocarbons. The hydrocarbons are divided first into open-chain compounds such as the paraffins, and closed-chain compounds such as benzene and its derivatives, and the former are further divided into saturated and unsaturated compounds.

The simplest series is the methane series or the paraffins; these have general formula C_nH_{2n+2} (where n = the number of carbon atoms in the molecule). The first member of the series is methane (CH_4), then follow enthane (C_2H_6), propane (C_3H_8), butane (C_4H_{10}), &c. The series is characterized by extreme stability; all the members are saturated, and are not easily attacked by chemical reagents. The first three members are

gaseous, then follow a series of liquids, and finally the higher members are solids. Solid paraffins and waxes belong to this series.

Of the unsaturated hydrocarbons there is the olefine series, general formula C_nH_{2n}. The first member of the series is ethylene or olefiant gas (C_2H_4). These are colourless substances; the first members are gaseous, then follow liquids, and there is a gradual change in physical properties on ascending the series. A still more unsaturated series of hydrocarbons is the acetylene series, general formula C_nH_{2-2}. The most important member is acetylene (C_2H_2).

Of the closed-chain compounds there is the benzene series (C_nH_{2n-6}), the first member of which is benzene (C_6H_6); these are stable compounds, and behave as saturated compounds. More complicated hydrocarbons include anthracene, naphthalene, phenanthrene, &c. The hydrocarbons are important industrially as solvents, lubricants, illuminants, and also fuels; they form the starting-point in the manufacture of dyes, explosives, and many organic compounds. Many of them occur naturally, e.g. paraffins in petroleum oil-wells; others are produced during the destructive distillation of coal, peat, and bituminous shales. *See* PARAFFINS; BENZENE; ANTHRACENE; NAPHTHALENE; ORGANIC CHEMISTRY.

HYDROCELE (hī'dro-sēl), a collection of serous fluid in some of the coverings of the testicle or spermatic cord. It is generally the result of an injury or an inflammation of the sac (*tunica vaginalis*) which surrounds the testicle. A large tumour may be formed, filled with fluid, which has often to be drawn off three or four times a year by means of a trocar and cannula. A radical cure may be effected by setting up an inflammation which brings the opposite surfaces of the sac into adhesion, and thus obliterates the cavity.

HYDROCHARITACEÆ, a nat. ord. of monocotyledonous floating and creeping plants, inhabiting ditches, rivers, and lakes in various parts of the world. The genus Anacharis (*Elodea*) belongs to it. *See* ANACHARIS.

HYDROCHLORIC ACID, or HYDROGEN CHLORIDE (HCl) is a colourless gas, readily soluble in water to a fuming, strongly acid solution. It is formed by the direct combination of its elements, hydrogen and chlorine, but is obtained commercially as a by-product in the manufacture of salt cake (the first stage in the Leblanc soda process) by heating common salt with sulphuric acid, when the following reaction takes place:

$$2NaCl + H_2SO_4 = 2HCl + Na_2SO_4.$$

The hydrochloric acid gas evolved is passed up towers or 'scrubbers,' down which a stream of water trickles and dissolves the gas.

The concentrated solution obtained forms the commercial muriatic acid or 'spirits of salt,' which has a specific gravity of 1·16, and contains about 30 per cent of the acid. The crude solution, which is usually of an orange colour, owing to impurities present, is treated with barium sulphide to precipitate arsenic, sulphuric acid, &c. It is then redistilled from glass or lead retorts, with or without the addition of sulphuric acid, a pure solution being thus obtained.

Hydrochloric acid is also made by the action of heat and steam on magnesium chloride, a by-product in the manufacture of potash salts from naturally-occurring deposits. The acid reacts with most metals, hydrogen being liberated and the chloride of the metal formed. With oxidizing agents such as nitric acid, manganese dioxide, &c., chlorine is produced.

Hydrochloric acid is largely used for cleaning iron before it is tinned or galvanized, and also for many other purposes in the arts and manufactures.

The series of salts, the chlorides, derived from hydrochloric acid are widely distributed, and are, with the exception of silver, lead, and mercurous chlorides, readily soluble crystalline salts. Sodium chloride, or common salt, is the most important member of this class, being present in seawater to the extent of nearly 3 per cent. It is the substance from which practically all the chlorine and chlorine-containing compounds of commerce are obtained.

It is used as a preservative for food, and in small quantities is necessary for the maintenance of health in animals living on a vegetable diet. When taken internally in larger quantities, it acts as an emetic and poison, often with fatal results. It is the main saline constituent of blood, and for this reason it is used for intravenous injections in the case of persons suffering from loss of blood. Externally it is used in the form of salt baths for the treatment of rheumatism and sciatica.

HYDROCHLORIC ETHER. *See* ETHYL (CHLORIDE).

HYDROCYANIC ACID, or PRUSSIC ACID (HCN), occurs in nature in the glucoside amygdalin, which is present in bitter almonds. A solution of the acid may be obtained by distilling potassium cyanide or ferrocyanide with dilute sulphuric acid. The pure substance is prepared by dehydrating

the aqueous solution with calcium chloride.

Hydrocyanic acid is a colourless mobile liquid which boils at 26° C., solidifies in the cold, and then melts at −14° C. It possesses a penetrating acrid smell, which in very weak solution only is suggestive of bitter almonds. It is excessively poisonous, a single drop taken internally causing instantaneous death, due to paralysis of the heart. Smaller doses cause pain in the head, giddiness, and nausea, accompanied by paralysis of the respiratory organs and of the spinal cord. In cases of poisoning, emetics should be given at once, followed by injections of ether or alcohol; artificial respiration should also be resorted to.

Hydrocyanic acid forms, with metallic bases, a series of salts, cyanides, which have an alkaline reaction and are also poisonous. *See* CYANIDES.

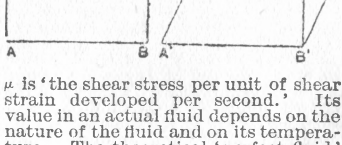
HYDRODYNAM'ICS is that part of the science of dynamics which deals with fluids. It is the science of the motion of fluids in relation to the forces acting upon them. Just as the term dynamics has a wider and a more restricted sense according as it is taken to include statics as well as kinetics, or to be identical with the latter, so the term hydrodynamics in its wider sense includes hydrostatics as well as hydrokinetics. The present article excludes the consideration of hydrostatics (q.v.).

The mathematical theory of hydrodynamics strictly applies to imaginary ideal fluids, which have such simple and exactly defined properties as to make mathematical treatment possible. These ideal fluids differ in important respects from the fluids of nature. Thus the ideal fluid of hydrodynamics is perfectly continuous, and any portion which is bounded by a geometrical closed surface remains continually bounded by that surface in all its subsequent motion, the surface changing in form but never losing its continuity. Actual fluids are molecular in structure, and continual interdiffusion goes on between contiguous portions. But in spite of this difference between the ideal and the actual, in many cases the behaviour of the latter is sufficiently closely represented by the calculable behaviour of the former.

The ideal fluid is defined to be a body which has no elasticity of shape, but perfect elasticity of bulk, or, in an important special case, is incompressible. No actual fluid is incompressible, but actual liquids have small compressibility. Actual gases are represented by the 'compressible fluid' of the mathematical theory.

There is a cross-classification of fluids into *viscous* and *non-viscous* or *perfect* fluids. Viscosity is mathematically specified as follows.

Let ABCD be the cross-section of a rectangular prismatic portion of a fluid which as 'parallel flow' in the direction AB, those particles having equal velocities which are at the same distance from the face of which AB is the section. Let A′B′C′D′ be the cross-section of the same fluid prism after one second has elapsed, the motion being such that A′B′C′D′ is a parallelogram having A′B′ = AB and B′E = BC, where B′E is the perpendicular let fall from B′ upon D′C′. Thus in one second a shearing strain whose measure is EC′/B′E (which we may denote by *s*) has been developed. The accompanying shear stress across AB or any plane parallel to AB may be denoted by *f*. Then μ, 'the coefficient of viscosity,' is measured by f/s. In words,



μ is 'the shear stress per unit of shear strain developed per second.' Its value in an actual fluid depends on the nature of the fluid and on its temperature. The theoretical 'perfect fluid' of hydrodynamics has $\mu = 0$, i.e. it has the same property when in motion which all fluids have at rest, of being unable to exert any but a *normal* force across any interface or upon any bounding surface.

The following are commonly adopted notations for quantities entering into hydrodynamic calculations:

x, y, z are the rectangular co-ordinates of a point P of the fluid; ρ is the density, μ the viscosity, and p the pressure of the fluid at P; u, v, w are the velocity-components of the fluid at P, and q the resultant velocity; X, Y, Z are the components of the force per unit mass acting on the body of the fluid in the neighbourhood of P.

Certain equations are established which form a sort of book-keeping method for the quantities involved. First, there is the 'mass-account.' This is given by the 'equation of continuity,' which expresses the condition that any change of mass of fluid occupying a given element of space must be accounted for by the flow of fluid across the geometrical bounding surfaces of the element.

In its differential form it is written

$$\frac{d\rho}{dt} + \frac{d.\rho u}{dx} + \frac{d.\rho v}{dy} + \frac{d.\rho w}{dz} = 0.$$

The elementary equivalent in the case of flow of an incompressible fluid in a pipe is Av = constant, where A is the area of any cross-section, and v the average velocity of the liquid across that section. Next, the 'momentum account', applying Newton's Second Law of Motion, expresses the condition that the time-rate of increase of momentum of the fluid in any element of space is equivalent to the resultant of the forces (including both thrusts on its bounding surface, and body-forces which act throughout its mass) acting on the fluid in that element, together with the excess of the momentum of fluid entering the element in unit time over that of the fluid leaving the element. In its differential form the 'momentum-account' is expressed by the 'equations of fluid motion' due to L. Euler, viz.

$$\frac{du}{dt}+u\frac{du}{dx}+v\frac{du}{dy}+w\frac{du}{dx}=\mathrm{X}-\frac{1}{\rho}\frac{dp}{dx},$$

with two other similar equations for the components parallel to the axes OY and OZ.

Instead of reckoning up the momentum-account for the contents of a given element of space, we may apply the reckoning to a given portion of fluid as it flows, and so arrive at another form of the differential equations of motion, also given by Euler, but usually named after Lagrange, who investigated them at a later date. The Lagrangian equations are not often used. They involve derivatives of the second order.

The 'energy-account' applies the condition that the rate of increase of the energy in any portion of fluid is equal to the rate at which work is being done upon it. The energy-equation is deducible from the equations of motion, and, for the case of an incompressible fluid, may be written in the form

$$\tfrac{1}{2}\rho\frac{\mathrm{D}q^2}{\mathrm{D}t}=-\left(u\frac{dp}{dx}+v\frac{dp}{dy}+w\frac{dp}{dz}\right)+\rho(\mathrm{X}u+\mathrm{Y}v+\mathrm{Z}w).$$

Here the symbol $\frac{\mathrm{D}}{\mathrm{D}t}$ refers to time-rate of increase, not at a fixed point in space, but following the motion of the fluid. In the most important case, when the body-forces have a potential Ω which is independent of t, so that $\mathrm{X}=-\frac{d\Omega}{dx}$, &c., the equation reduces to

$$\tfrac{1}{2}\rho\frac{\mathrm{D}q^2}{\mathrm{D}t}=-\rho\frac{\mathrm{D}\Omega}{\mathrm{D}t}-\left(u\frac{dp}{dx}+v\frac{dp}{dy}+w\frac{dp}{dz}\right).$$

From this, by integration over a given region, we get

$$\frac{\mathrm{D}}{\mathrm{D}t}(\mathrm{T}+\mathrm{V})=-\iiint\left(u\frac{dp}{dx}+v\frac{dp}{dy}+w\frac{dp}{dz}\right)dxdydz,$$

where

$$\mathrm{T}=\tfrac{1}{2}\iiint\rho q^2dxdydz,$$

$$\mathrm{V}=\iiint\rho\Omega dxdydz,$$

T being the kinetic energy, and V the potential energy of the fluid within that region.

A *line of flow* is a line drawn in the fluid so that the direction of the flow at any point is that of the tangent to the line. A *stream-line* is the actual path of a particle of the fluid.

In an important class of cases a function ϕ exists (the *velocity potential*), such that

$$u=-\frac{d\phi}{dx},\ v=-\frac{d\phi}{dy},\ w=-\frac{d\phi}{dz},$$

and it can be shown that if the body-forces have a potential, and if ρ is constant or a function of p only, then a portion of a fluid having a velocity-potential at any instant will continue to possess a velocity-potential ever afterwards. Where ϕ exists, the lines of flow are everywhere perpendicular to the surface for which ϕ is constant. In this case Euler's Equations of Motion can be integrated, giving the result

$$\int\frac{dp}{\rho}=\frac{d\phi}{dt}-\Omega-\tfrac{1}{2}q^2+\mathrm{F}(t),$$

where $\mathrm{F}(t)$ is an arbitrary function of t. In *steady motion*, i.e. motion in which the velocity at a given point of space is independent of the time, this reduces to

$$\int\frac{dp}{\rho}+\Omega+\tfrac{1}{2}q^2=\text{constant}$$

(Bernoulli's Theorem).

The *constant* in the present case, in which the motion is *irrotational* (see below), has the same value throughout the fluid. But it can be shown that Bernoulli's Theorem is true in *rotational* motion also, the constant keeping the same value along any one stream-line, but varying from one stream-line to another. When gravity is the only body-force acting, $\Omega=gz$, where z is the height above a fixed datum-level. In this special case Bernoulli's Theorem may be written

$$\int\frac{dp}{g\rho}+z+\frac{q^2}{2g}=\text{constant}.$$

This equation has important applica-

tions in hydraulics, and is expressed in words as follows: 'The sum of the pressure-head, the height above datum-level and the velocity-head, is constant along a stream-line.' It includes Torricelli's Theorem that the velocity of a jet of water issuing from an orifice in a vessel containing a liquid having a free surface practically at rest, is the same as that which would be acquired by a body falling freely from the level of the free surface to that of the orifice. It is applicable to explain the theory of the 'Venturi water-meter.'

Rotational and Irrotational Motion. If a small spherical portion of a fluid were suddenly to become solidified, it would in general have rotation about an axis. This is 'molecular rotation' or 'vortex motion.' If the 'molecular rotation' at every point of a portion of fluid is zero, its motion is said to be 'irrotational.' The components of molecular rotation with reference to the axes of co-ordinates are:

$$\xi = \tfrac{1}{2}\left(\frac{dw}{dy} - \frac{dv}{dz}\right), \eta = \tfrac{1}{2}\left(\frac{du}{dz} - \frac{dw}{dx}\right),$$

$$\zeta = \tfrac{1}{2}\left(\frac{dv}{dx} - \frac{du}{dy}\right).$$

If $\xi = \eta = \zeta = 0$, then $udx + vdy + wdz$ is an exact differential, and its integral $\int (udx + vdy + wdz)$ along any line in the fluid is called the 'flow' along that line, and is the same for all co-terminous lines which are 'reconcilable', i.e. which can be made to coincide by continuous deformation in the fluid. If the end points of the path coincide, it becomes a circuit, and the value of $\int (udx + vdy + wdz)$ taken round the circuit is called the 'circulation' of the circuit. It is zero for every circuit in irrotational motion, provided the fluid is 'simply-connected.'

In rotational motion lines can be drawn which at every point have the same direction as the axis of molecular rotation at that point. Such lines are 'vortex-filaments,' and they must either form closed circuits or extend to a boundary of the fluid. Helmholtz proved that a vortex-filament persists, and is always composed of the same fluid particles, though it may change in form. He also proved that in a perfect fluid vortex motion can neither be generated nor destroyed. This property suggested to Lord Kelvin his vortex-ring theory of atoms. A tube of fluid consisting of the vortex-filaments passing through any closed circuit is called a vortex-tube. The 'circulation' round any circuit on the surface of the tube is a constant if the circuit encloses the tube, and is zero if it does not enclose it, but is 'reconcilable' to a point.

The calculation of fluid motions which are rotational is difficult, and has been effected only in the simpler cases, e.g. in two-dimensional motion. The very simple case of a fluid rotating like a rigid body reduces to a problem of hydro-statics, by the artifice of assuming it at rest under 'centrifugal force.' A fluid may have rotational motion without 'molecular rotation,' as in the so-called 'free vortex' of hydraulics.

The presence of a fluid increases the effective inertia of a solid body in motion. The amount of the increase has been calculated for a few bodies, such as spheres and ellipsoids. For a sphere moving in an infinite liquid, the effective inertia exceeds the actual inertia by exactly one-half of the mass of the fluid displaced by the sphere.

For the applications of hydrodynamics to problems in hydromechanics, such as flow of water in pipes, and the action of water-wheels and turbines, *see* HYDRAULICS AND HYDRAULIC MACHINERY; TURBINE, WATER. *See also* TIDES; WAVES.—BIBLIOGRAPHY: H. Lamb, *Hydrodynamics*; A. B. Bassett, *Elementary Treatise on Hydrodynamics and Sound.*

HYDRO-ELECTRIC ENGINEERING, the science of generating electricity by the use of water-power. Water is capable of doing mechanical work in falling to a lower altitude. The maximum mechanical work 1 pound of water can do is h foot-pounds where h is the vertical height through which the pound of water falls. If 33,000 pounds of water fell through a height h in every minute, then the work done per minute would be 33,000 h, i.e. the rate of doing work would be h horse-power. This output of energy cannot be all turned into electrical energy; some of it is unavoidably wasted in the processes of transformation.

The usual practical process is this: a lake is found in a mountain range on which there is a heavy waterfall. All the outlets of the lake but one or two are dammed, so that all the rain falling on the hills and running into the lake must leave it through the openings left for the purpose. If the lake is, say, 3,000 feet above the level of the surrounding country, the water in falling to the lower country will drop through 3,000 feet and do 3,000 foot-pounds of work per pound.

Very large pipes are joined to the

lake outlets and carried downwards to the lower level, where turbines are placed. The course of these pipes is kept as straight and as vertical as possible. This reduces the losses of energy in pipe friction. On reaching the lower level the water is passed through water-turbines, which absorb about 85 per cent of the energy in the falling water. After passing through the turbines, the water runs away by a large canal-like duct called a 'tail race,' whence it is led to a river or the sea and discharged.

The turbines are usually coupled to alternating current three-phase electric generators (q.v.). These machines generate electrical energy at a moderate voltage, say 3,000 volts. The electrical energy is led from the generators to a bank (group) of transformers, where the pressure of the electricity is changed from 3,000 volts in-coming to about 100,000 out-going if the electricity is used in a distant town.

The high-tension terminals of the transformers (q.v.) are connected to the transmission-line, which usually consists of six or more copper or aluminium conductors hung on steel towers. This line crosses the country from the electric power-station, which may be, and probably is, in a mountainous region away from large cities, to the industrial districts where the electrical energy is used.

The 'receiving-end' of the line, i.e. the town end of it, as it were, enters a transformer house, where a bank of transformers again converts the energy from 100,000 volts to the distribution voltage required. Usually a double transformation takes place here, from, say, 100,000 to 3,000 volts, and again 3,000 volts down to a lower voltage for general distribution purposes. The over-all efficiency of such a system is about 70 per cent. *See* TURBINES; WATER; POWER TRANSMISSION.—Cf. A. H. Gibson, *Hydro-electric Engineering*.

HYDRO-EXTRACTOR, a machine used in washing, milling, dyeing, bleaching, and finishing departments of the textile industry, as well as in laundries and other places where it is desired quickly to expel the bulk of moisture from yarns, fabrics, and the like. The machine consists of two concentric drums or cylinders, one within the other, open at the top, and having the inner cylinder perforated in some way so that the expelled liquid may escape and be conducted to an outlet pipe. The outer drum forms a substantial and fixed support, while the inner drum rotates, when desired, at a high velocity about a vertical shaft suitably journalled in the base of the outer drum or foundation, and in the curved bridge-piece of the upper part of the outer drum.

The rapid motion of the inner drum generates sufficient centrifugal force to cause the cloth or yarn to be pressed against the inner circumference or side of the drum, and to expel thereby the bulk of the liquid with which the goods were originally saturated; the liquid then escapes as already indicated. As the inner drum rotates, the liquid flies tangentially from the goods through the perforations in much the same way as it does from a mop when the latter is trundled to dry it more or less. In both cases a certain amount of moisture remains; indeed, in many instances it is not desired to expel all the moisture, and in no case is the material perfectly dry.

HYDROFLUOR'IC ACID, or HYDROGEN FLUORIDE (HF), a colourless gas of very pungent odour which fumes in contact with air. On the skin it produces blisters, it chars organic substances such as paper or wood, attacks glass rapidly, and is a very poisonous substance. If cooled down, the gas may be liquefied, and pure anhydrous hydrofluoric acid, which is difficult to prepare owing to its great corrosive action and its affinity for moisture, is a colourless liquid which boils at 19° C.

Hydrofluoric acid is soluble in water, yielding a strongly acid solution which fumes in air and attacks glass, &c., just as the gas does. On this account commerical hydrofluoric acid is stored in wax-lined bottles or guttapercha bottles, as it has little action on these substances. The solution and the gas are employed in glass-works to mark graduated apparatus. The glass to be etched is coated with a thin layer of wax, and the design traced with a fine-pointed instrument; after etching by exposing to hydrofluoric acid gas or solution, the wax is dissolved away, and the design becomes visible wherever the acid has come in contact with the glass. It is also used in mineral analysis for the decomposition of silicates. Hydrofluoric acid is manufactured from calcium fluoride and concentrated sulphuric acid in cast-iron cylinders. The acid is condensed in spiral lead condensers, and collected in lead receivers.

HYDROGEN, chemical symbol H, atomic weight 1·008, the lightest of all the elements. It occurs free in the atmosphere of the sun, and in small quantity in volcanic gases and the gases issuing from oil-wells. In the combined state it is very abundant. Water contains one-ninth part by weight of hydrogen. It is an essentia

constituent of all acids, and is present in all vegetable and animal organic matter. Pure hydrogen is a colourless, tasteless, odourless gas, very slightly soluble in water. It is a non-supporter of combustion, but is itself combustible, burning in air or oxygen with production of water. The flame of hydrogen is almost non-luminous and is intensely hot.

The densities of gases are usually stated relative to the density of hydrogen taken as unity. Hydrogen long defied liquefaction, but after liquid air could be obtained in quantity, Dewar succeeded in liquefying the gas by compressing it to 180 atmospheres and cooling with liquid air. Liquid hydrogen is colourless, and boils at —252° C. By rapid evaporation of the liquid, hydrogen may be obtained as an ice-like solid.

Hydrogen combines with some elements directly. Thus, hydrogen and oxygen combine explosively to form water if 1 volume of oxygen and 2 volumes of hydrogen are brought together in a confined space and a light is applied. Hydrogen and fluorine combine to form hydrofluoric acid, HF, on merely mixing the elements.

Hydrogen and chlorine combine immediately if mixed and exposed to bright sunlight. Other elements unite with hydrogen by the aid of a catalyst, or indirectly. Nitrogen and hydrogen form ammonia, NH_3. Carbon and hydrogen form acetylene, C_2H_2, or other hydrocarbons.

Hydrogen is usually prepared in the laboratory by the action of dilute acids, hydrochloric acid or sulphuric acid, on metals such as zinc or iron. The metal displaces hydrogen, forming a salt and liberating the gas. Thus the action of zinc on sulphuric acid is represented by the equation $Zn + H_2SO_4 = ZnSO_4 + H_2$. Hydrogen may also be prepared by electrolysis of water, by the action of steam on red-hot iron, and by the decomposition of some metallic hydrides by means of water.

On account of the intense heat of the oxyhydrogen flame, attaining a temperature of 2,800° C., it is used in autogenous welding in steelworks, and for fusing substances of high melting-point such as quartz and platinum. It is produced in quantity for use in aeronautics; for hardening oils; as a reducing agent in the manufacture of organic substances such as aniline and naphthylamine; and as a fuel, usually as water-gas.

HYDROGEN PEROXIDE, H_2O_2, is a compound of oxygen and hydrogen much richer in oxygen than water, H_2O. It is usually met with in aqueous solution, termed 10 or 20 volumes peroxide, according to the number of volumes of oxygen evolved when one volume of the solution is decomposed. In the pure form it is a syrupy liquid with a specific gravity 1·45, and in this state it is extremely unstable. When the solution is heated, oxygen is evolved and water is formed.

The readiness with which the peroxide gives up half its oxygen renders it a valuable oxidizing agent. Thus it is used to restore the brilliancy of oil paintings which have become discoloured. This discoloration is generally due to the formation of black lead sulphide, and the peroxide transforms this into white lead sulphate, $PbSO_4$. It is also used as a bleaching agent, and is a powerful antiseptic. It is usually prepared by the action of dilute sulphuric acid on hydrated barium peroxide, BaO_2, $8H_2O$; or in small quantities by decomposing sodium peroxide with dilute hydrochloric acid at low temperatures.

HYDROGEN SULPHIDE, or **SULPHURETTED HYDROGEN,** sometimes termed hydrosulphuric acid, H_2S, is a colourless inflammable gas occurring in volcanic gases, and in certain mineral springs, the springs at Harrogate, for instance. It is produced during the putrefaction of sulphurous organic matter, and when organic matter containing sulphur is destructively distilled. Crude coal-gas contains sulphuretted hydrogen, produced from the sulphur present in coal. It is usually prepared by the action of dilute hydrochloric acid on iron sulphide.

It has a sweet taste, but a very nauseating odour resembling that of rotten eggs. It is poisonous when inhaled, and experiments have shown that birds died in air which contained $\frac{1}{1000}$ part of the gas. It is a strong reducing agent, and is largely used in laboratory analysis, as almost all the metals form sulphides with it.

The sulphides or salts of sulphuretted hydrogen are nearly all insoluble in water, and many have characteristic colours. Thus, antimony sulphide is bright orange when precipitated, arsenic sulphide is canary yellow, and copper sulphide is brownish-black.

HYDROGRAPHY is the science which deals with the surface waters of the globe: oceans, seas, lakes, rivers, and underground waters. It includes the study of their distribution, composition, and physical properties, the study of tides, currents, the flow of rivers, and problems of water-supply, as well as the precise survey and charting of waters for the purpose of navigation. Hydrography overlaps the physical aspects of oceanography (q.v.), but is not concerned with the floor of the oceans, the origin of ocean

basins, or the flora and fauna of the waters.

In a narrower sense hydrography is sometimes confined to the study of rivers, lakes, and underground waters, but there is no common agreement as to the scope of the subject. The hydrographic survey of a sea or lake entails numerous observations at many stations, the position of which must be accurately determined. In addition to ascertaining the depth it is necessary to take the temperature, specific gravity, and salinity of the water at the surface, bottom, and intermediate depths, as well as the direction of flow of the currents.

Temperature and current observations must be made on the spot, but determinations of specific gravity and salinity can be done on shore if a sample of the water is secured and kept without contamination. It is desirable that similar observations should be taken periodically at the same stations in order that seasonal changes may be noted. By these means the circulation of the waters can be determined. Information of that nature, together with biological researches on the food and habits of fishes and other marine animals, have great practical importance in relation to food production.

Principally with this end in view the International Commission for the Scientific Investigation of the North Sea was established in 1899, the participating countries being Great Britain, Germany, Holland, Belgium, Russia, Denmark, Sweden, and Norway. Many marine biological laboratories in European and American coasts undertake periodical hydrographical work in waters adjacent to them. Most notable are the stations at Bergen and Plymouth, and the Musée Oceanographique at Monaco.

Temperature observations are taken either by reversing thermometers or insulated water-bottles lowered to the desired depth. Salinity is expressed in the total weight of salts in a given weight of water. Its total range of variation being only from 33 to 37 per 1,000, extreme accuracy in salinity determinations is essential, since by the salinity of a water sample it is often possible to trace its movement and thus throw light on marine circulation. The various salts occur in practically constant proportions, so that the determination of one salt gives the salinity and specific gravity. Conversely, by the determination of specific gravity the salinity can be reached.

Specific gravity is found by either the total immersion hydrometer or the electrolytic conductivity of the water, to determine which no sample need be brought on board, the electrodes being lowered to the required depth. Salinity can also be ascertained by precipitating the chlorides with silver nitrate. The content of gases in water is determined by boiling the water and collecting the gases, or else by titration. Accurate current observation is one of the most difficult tasks in hydrographical research. Various forms of current meter (q.v.) are used, but they necessitate the vessel being anchored, and in rough water the accuracy of their results is doubtful.

Recent research has revealed the existence of great vortex movements in ocean waters, and their investigation offers peculiar difficulties. Hydrographic survey is carried out by soundings, with either the lead-line or sounding-wire. In shallow and much-frequented waters, such as natural harbours and their approaches, detailed work is essential, but soundings should be supplemented by the use of wire drags. A wire rope is stretched at a depth of about 30 feet between two vessels steaming on parallel courses 500 to 1,000 feet apart. The method effectively locates any pinnacle rocks that would imperil navigation. Photohydrography, or the photography of the sea-floor from aeroplanes, has been tried without much success as far as charting is concerned. The rise and fall of the tides is ascertained by the use of tide gauges, which are either self-registering or simple graduated poles which must be read at intervals.

Charts of all known coasts of the world are published by the British Admiralty (Hydrographic Department), which for centuries has maintained surveying vessels, on scales dependent on the amount of traffic, the difficulties of navigation, and the state of knowledge. These are continually revised as fresh information comes to hand. Captain James Cook, R.N., who, in H.M.S. *Endeavour* discovered Australia in 1770, was the "Father of Surveyors." He proceeded to survey the Barrier Reef (q.v.), and his soundings stand to-day. The United States Coast and Geodetic Survey and the United States Hydrographic Office publish charts of United States coasts, and of the great lakes, and also some of Mexico and Central America.

France, Germany, Holland, Norway, and some other nations also publish official charts of certain coastal waters. The principal sea-powers of the world have survey vessels continually at work checking, verifying, and extending coastal surveys, but few coasts outside Europe, the Indian Empire, the United States, and Japan are yet completely charted.

The hydrography of rivers and

lakes is of growing importance as increase of population makes greater demands on the water resources of a country. In addition to the survey of the river and the calculation of its catchment area it is necessary to know the rate and volume of flow at all seasons of the year. For this purpose gauging stations are established. Analysis of water samples shows the content of dissolved and suspended matter, considerations of importance in the utilization of the water.

Many countries are now paying close attention to the use of water as a source of power. The study of water resources is also important in relation to the navigability of rivers and lakes and the water-supply available for canals. In arid countries like Australia the investigation of underground water available for irrigation and wells is vital to the settlement of the land. In some countries the regulation of rivers and lakes has received much attention. From early times there have been gauges on the Nile; the regulation and distribution of its water is the chief problem in Egyptian administration.

The Danube and the principal German rivers have been exhaustively studied. Several Russian and Siberian rivers have been charted in detail. The Rhône and the Seine are among the French rivers that have received most attention. The survey of the Scottish inland lochs and the principal English lakes has been made by private enterprise. In the United States and Canada there are State departments charged with the study of the water resources of the country. *See* DEEP-SEA EXPLORATION.—BIBLIOGRAPHY: Wharton, *Hydrographical Surveying*; Sir John Murray and J. Hjort, *The Depths of the Ocean*; Russell, *River Development*; Sir John Murray, *Bathymetrical Survey of the Fresh Water Lochs of Scotland*; J. C. Hoyt and N. C. Grover, *River Discharge*; Helland-Hansen, *The Norwegian Sea*; publications of Dominion of Canada Water Power Branch, United States Coast and Geodetic Survey, United States Geological Survey (Water Power Branch), International North Sea Commission, and various deep-sea and Antarctic expeditions.

HYDROM'ETER, an instrument for measuring the densities of liquids; one type, the Nicholson hydrometer, is also employed to measure the densities of solids. The hydrometer of variable immersion is usually made of glass, and consists of a hollow closed tube which is expanded into two bulbs at the lower end. The tube contains a graduated scale, and the lower, smaller bulb is loaded with mercury or lead shot so that the hydrometer may float in a vertical position.

By Archimedes' principle, the weight of a floating body is equal to the weight of liquid which the body displaces. Thus the hydrometer will float high in a heavy liquid, but will sink more deeply in a light liquid, the volume of the immersed portion being inversely proportional to the density of the liquid. The scale is so graduated that the density of the liquid is given

Twaddel's Hydrometer. To find the specific gravity multiply reading by 5, add 1,000, divide by 1,000, e.g. for reading 24, $24 \times 5 = 120$. Specific gravity = 1·120

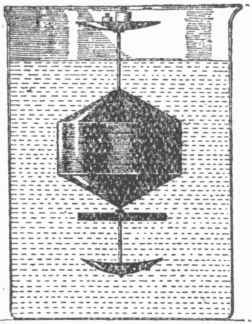
by the scale reading which coincides with the surface of the liquid.

This form of hydrometer is sometimes used as a lactometer for testing the density of milk; another is employed by revenue officers to test the alcoholic content of liquors; whilst another form is useful, in the care of storage batteries, to indicate by the density of the acid the state of the cells during charging and discharging.

The Nicholson hydrometer is termed one of constant immersion, since it is always adjusted by added weights to float so that a given mark on the stem is level with the surface of the liquid

in which the instrument is immersed. If the added weight W_0 is known, the instrument can be used to determine the densities of solids and liquids. Let a solid of weight less than W_0 be placed on the top pan, and a weight W_1 added to sink the hydrometer in water to the mark on the stem. Then $W_0—W_1$ is the weight of the solid. If the solid is now transferred to the lower pan, and immersed in water, the weight W_2 required to adjust the instrument as before will be greater than W_1, and $W_2—W_1$ measures the weight of water displaced by the solid. Hence the density of the solid is given by the ratio of $W_0—W_1$ to $W_1—W_2$.

This holds whether the solid is lighter or heavier than water. If W is the weight of the hydrometer itself, then $W + W_0$ measures the weight of water which the instrument displaces when floating at its normal depth. If, on being placed in another liquid, it is sunk to the mark by adding a weight W^1 to the top pan, then $W + W^1$ is the weight of this liquid displaced by the hydrometer. The density of the second liquid is found from the ratio of $W + W^1$ to $W + W_0$. All forms of these instruments are subject to inaccuracy caused by the action of surface tension.



Nicholson's Hydrometer devised by Professor Muir

HYDROP'ATHY, a method of treating diseases by the use of pure water both internally and externally, which has come extensively into practice. The system was known several centuries before the Christian era, and was advocated by the ancient Greek master of medicine Hippocrates, and adopted by many of his Greek, Roman, and Arabic-speaking followers; but in modern times it was revived by Vincenz Priessnitz, a Silesian peasant, who in 1829 established at his native village of Gräfenberg an institution for the hydropathic treatment of diseases, and invented a variety of forms in which the water cure might be applied, such as the wet-sheet pack, the dry blanket or sweating pack, the sitz, douche, plunge, wave, &c., baths. The new system soon acquired popularity, and the original establishment expanded into an extensive suite of buildings. Other hydropathic institutions soon sprang up in other parts of Germany.

In 1842 a Hydropathic Society was formed in London, and ere long numerous establishments were erected all over the United Kingdom. Before Priessnitz's death in 1851 he had the satisfaction of seeing his system adopted extensively throughout Europe, as well as in the United States of America, where it was introduced in 1843.

In many cases there can be no doubt of patients having received great and lasting benefit by a sojourn at a hydropathic institution, and the free use of water in its various forms of appliance; but it may well be doubted whether these advantageous results are not as much to be attributed to the ablutions, exercise, and diet to which in such circumstances the patients readily submit themselves as to the wet bandages, douches, and other forms of hydropathic treatment. Apart from the full regime of a hydropathic institution, water has come to play a large part in the treatment of disease, not merely for administration by the mouth or for the washing of the alimentary canal, but also in the form of baths, wet-packs, fomentations, douches, sprays, &c., administered in hospital or at home.

HYDROPHO'BIA (Gr. *hydōr*, water and *phobos*, fear), a specific disease, technically known as *rabies*, arising from the bite of a rabid animal. The animals most liable to be afflicted with the disease are dogs; but cats, wolves, foxes, &c., are also subject to it. The early symptoms of rabies in the dog are restlessness and general uneasiness, irritability, sullenness, an inclination for indigestible and unnatural food, and often a propensity to lap its own urine. As the disease proceeds the eyes become red, bright and fierce, with some degree of strabismus or squinting; twitchings occur round the eye, and gradually spread over the whole face.

After the second day the dog usually begins to lose perfect control over the voluntary muscles. He catches at his food, and either bolts it almost unchewed, or, in the attempt to chew it, suffers it to drop from his mouth.

This want of power over the muscles of the jaw, tongue, and throat increases until the lower jaw becomes dependent, the tongue protrudes from the mouth, and is of a dark, and almost black colour. A peculiar kind of delirium also comes on, and the animal snaps at imaginary objects. His thirst is excessive, although there is occasionally a want of power to lap.

His desire to do mischief depends much on his previous disposition and habits. He utters also a peculiar howl, and his bark is altogether dissimilar from his usual tone. In the latter stages of the disease a viscid saliva flows from his mouth, and his breathing is attended with a harsh, grating sound. The loss of power over the voluntary muscles extends, after the third day, throughout his whole frame; he staggers in his gait, and frequently falls. On the fourth or fifth day of the disease the dog dies, sometimes in convulsions, but more frequently without a struggle.

In regard to man the rabid virus seems to be more violent when it proceeds from wolves than from dogs. It appears to be contained solely in the saliva of the animal, and does not produce any effect on the healthy skin. But if the skin is deprived of the epidermis, or if the virus is applied to a wound, the inoculation will take effect. The development of the rabid symptoms is rarely immediate; it seldom takes place before the fortieth or after the sixtieth day, but in some cases has occurred after six months or even longer.

It begins with a slight pain in the scar of the bite, sometimes attended with a chill; the pain extends and reaches the base of the breast if the bite was on the lower limbs, or the throat if on the upper extremities. The patient becomes dejected, morose, and taciturn. He prefers solitude, and avoids bright light; frightful dreams disturb his sleep; the eyes become brilliant; pains in the neck and throat ensue. These symptoms precede the rabid symptoms two or three days. They are followed by a general shuddering at the approach of any liquid or smooth body, attended with a sensation of oppression, deep sighs, and convulsive starts, in which the muscular strength is much increased.

A foamy, viscid slaver is discharged from the mouth; the deglutition of solid matters is difficult; the respiration hard; the skin warm, burning, and afterwards covered with sweat; the pulse strong; the fit is often followed by a syncope; the fits return at first every few hours, then at shorter intervals, and death takes place generally on the second or third day. No means have yet been found of arresting the progress of the poisonous virus after it has once developed in the system.

The treatment, therefore, consists in preventing its development, which may be effected by applying a ligature, where possible, to impede the circulation from the wound, by sucking it, and thoroughly cauterizing it either with nitrate of silver or with iron heated to a white heat, the pain of cautery being less as the temperature is greater. If these means are not available, any burning substance and most acids may be used. After being bitten by a dog suffering from rabies it is of vital importance not only to treat the wound locally in the way suggested, but to subject the patient as soon as possible to the Pasteur treatment to counteract the development of the virus.

M. Pasteur put forward a method of preventing the development of the disease by a system of successive inoculations with rabid virus of greater and greater intensity; the inoculation being made the first day with marrow which has been extracted from the rabid animal 12, 10, and 8 days; then the second day with marrow extracted 6, 4, and 2 days; the third day with one day's marrow, &c. About 15 per cent of the people bitten by rabid dogs contract hydrophobia. In cases not treated by the Pasteur method death is practically certain. Owing to the great dread of the disease, the legislature of the United Kingdom enforced the law of dog-muzzling over large areas in which Hydrophobia existed, so that by now the disease is practically extinct in this country.—BIBLIOGRAPHY: *Annales de l'Institut Pasteur* (1887–8); F. Karslake, *Rabies and Hydrophobia*.

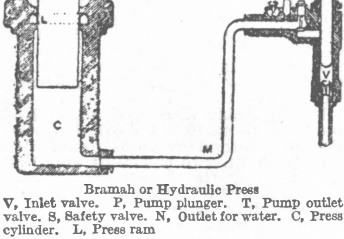
HYDROPHYLLACEÆ, or **HYDROLEACEÆ**, a natural order of gamopetalous Dicotyledons, allied to Polemoniaceæ, mainly North American herbs. It includes several favourite hardy annuals, such as the species of Nemophila and Phacelia.

HYDROPTERIDEÆ, or **WATER-FERNS**, a collective name frequently employed for the Marsiliaceæ and Salviniaceæ, two families of Leptosporangiate Ferns, which agree in being heterosporous and aquatic, but otherwise are not closely related.

HYDROQUINONE, or PARA-DIHYDROXY-BENZENE ($C_6H_4(OH)_2$), is prepared by the oxidation of aniline with an ice-cold mixture of potassium or sodium bichromate and sulphuric acid, followed by the reduction of the product (benzoquinone) with sulphur dioxide. The mixture is then filtered and the hydroquinone extracted with ether. It

forms colourless crystals, having a slightly sweet taste, melting at 169° C., and is readily soluble in alcohol, ether, and hot water. Chemically, it acts as a reducing agent, and is used under the name of quinol in photographic developers. Alone, it gives extremely strong, rather hard negatives of a bluish-black tone, but in conjunction with metol excellent results are obtained.

HYDROSTAT'ICS is the science of the statics of fluids. A fluid (q.v.) is a body which, when its parts are relatively at rest, can only exert a normal thrust upon any surface with which it is in contact, or across any ideal surface separating contiguous portions of it. In other words, a fluid at rest cannot support the least shearing stress. It has no 'elasticity of shape,' but its 'elasticity of bulk' is perfect. All fluids, however viscous, conform practically perfectly to this definition



Bramah or Hydraulic Press
V, Inlet valve. P, Pump plunger. T, Pump outlet valve. S, Safety valve. N, Outlet for water. C, Press cylinder. L, Press ram

—hence the theorems of hydrostatics apply to real fluids with a mathematical exactness which is almost unique in theoretical physics. The whole theory of the equilibrium of fluids is deduced from a few fundamental postulates, viz. the laws of statics, and the defining property of a fluid which has just been stated.

Intensity of fluid pressure at a point. Suppose a small plane surface to pass through a point P in a fluid at rest. The portions of the fluid separated by this surface exert on each other equal and opposite forces at right angles to the surface. If F be the measure of one of these forces, and A that of the area of the surface, then F/A is the average pressure across the surface, and the limiting value of this when A tends to zero is 'the pressure at P in the direction perpendicular to the surface.' It can be proved that the pressure at a point is the same in all directions, hence it is unnecessary to specify direction when pressure at a point is spoken of.

Pascal's Principle, or 'the principle of transmissibility of fluid pressure,' asserts that if the pressure at any point of a fluid in equilibrium is increased, then to maintain equilibrium the pressure at every other point of the fluid must rise by the same amount. This principle (like all others in hydrostatics) is deducible mathematically from the definition of a fluid. It is the basis of the theory of the Bramah Press. In a heavy fluid at rest the surfaces of equal pressure are horizontal, and hence the free surface of a liquid is horizontal.

If the difference of level between two points in a continuous mass of fluid at rest is h feet, and the fluid has a uniform density of w pounds per cubic foot, then the pressure at the lower point exceeds that at the upper point by wh pounds per square foot. Thus the pressure at a depth of 10 feet below the surface of still water is about 623 pounds per square foot greater than the atmospheric pressure at the surface. At a depth of 34 feet the pressure is double the ordinary atmospheric pressure. On account of the greater density of mercury, the same pressure is got at a depth of about 30 inches or 760 millimetres in mercury.

In the ordinary mercurial barometer the pressure inside the tube above the mercury is practically zero, so that the difference between the level of the free surface within the tube and that which is exposed to the atmosphere gives an accurate measure of the atmospheric pressure. In hydraulics the pressure is often expressed as a 'head of water' of so many feet. The rule for calculating the total pressure on an immersed surface is that the average pressure per unit area of the surface is exactly the pressure at the geometrical 'centre of gravity' of the surface.

Thus if a vertical plane rectangle is immersed so that h is the depth of its middle point, the average pressure upon it is wh, where w is the weight per unit volume, and the total pressure is whA, where A is the area of the surface. But though the resultant thrust is whA, its line of action does not meet the surface at its centre of gravity but lower down, at a point called the 'centre of pressure.'

The depth of the centre of pressure of any immersed plane surface is got by dividing the second moment of the plane area about the line in which its plane cuts the surface of zero pressure, by the first moment of the area about the same line. For example, if the vertical rectangle has one side in the surface of zero pressure, the depth of the centre of pressure is two-thirds of the depth of the rectangle.

The Principle of Archimedes is of the utmost importance for problems on the equilibrium of floating bodies, and, more generally, for the discussion of pressures on immersed bodies. Its precise statement is as follows: "The resultant of the fluid pressures on a wholly or partially immersed body is equal to the weight of the 'fluid displaced' and acts vertically upwards in a line through the 'centre of buoyancy.'"

The 'fluid displaced' is that which would exactly fill the cavity left if the immersed body were removed. The 'centre of buoyancy' is the centre of gravity of the 'fluid displaced.' The upward force is called the buoyancy. Applying this principle to a wholly immersed body heavier than the fluid, and supported by a fine cord, the problem is reduced to that of a body acted on by three forces—the weight W of the body, the buoyancy W′, and the pull P of the cord. The two former being vertical, the third (and therefore the cord) must be vertical also.

Further, $P + W' = W$. Hence $P = W - W'$. P is the 'apparent weight,' and we see that it is less than the true weight by the amount of the buoyancy. This difference between apparent and real weights is the basis of many methods of determining specific gravity. An experiment on the same principle can be employed to determine the density of the fluid if that of the immersed body is known (*see* HYDROMETER). The apparent weight of a body in air is usually taken as the real weight, but air, though light, has weight, and a body in air is acted on by a 'buoyancy' equal to the weight of air displaced. In exact weighings this must be taken into account if the density of the body differs much from that of the counterpoise weights used.

Applying Archimedes' Principle to the case of a freely floating body, we find that it will displace an amount of fluid equal in weight to itself.

The pressure of a fluid without weight would be the same at all points. For many practical purposes we may treat air and gases as having no weight, and therefore having the same pressure throughout, but in the case of the atmosphere, the weight is of importance. The density, like the pressure, decreases as we go upwards. To calculate the pressure p at a height x above the sea-level, we proceed as follows. Let w denote the weight of air per unit volume, at height x. We have $dp = -wdx = -(w_0 p/p_0)dx$, by Boyle's Law, where w_0 and p_0 are the values of w and p at sea-level. Hence $dp/p = -(w_0/p_0)dx$, and, by integration, $\log_e p - \log_e p_0 = -w_0 x/p_0$, or $x = (p_0/w_0)(\log_e p_0 - \log_e p)$.

This formula gives the relation between x and p on the supposition that p is proportional to w, which will be the case if the temperature is uniform. If the temperature varies, a correction must be made. The formula is the basis of *hypsometry*, the science of determining heights by barometric observations. If H denotes the depth of a fluid of uniform density w_0 which would give a pressure p_0, then $w_0 H = p_0$, and H is called 'the height of the homogeneous atmosphere.' Its value depends only on the temperature. For the temperature 0° C., H (in feet) is about 26,200, so that if x be expressed in feet, we have $x = 26{,}200(\log_e p_0 - \log_e p)$. (*See* HEIGHTS, MEASUREMENT OF.)

Stability of Equilibrium of Floating Bodies. A body is said to be in *stable* or *unstable* equilibrium according as it tends to return to or recede from the position of equilibrium when slightly displaced from it. If the body is in equilibrium also in its slightly displaced position, the equilibrium is *neutral*. Now, in the case of a completely immersed floating body, such as a submerged submarine, we have only two forces acting, the weight of the vessel acting vertically downward at G, its centre of gravity, and the 'buoyancy' acting vertically upward at B, the centre of buoyancy.

For equilibrium the buoyancy must equal the weight, and BG must be vertical. For angular displacements about a horizontal axis the equilibrium will be stable or unstable, according as B is above or below G. For displacements not involving such angular motion the equilibrium is neutral. In the case of a vessel floating partly immersed, the conditions for stability are different.

For vertical displacements the equilibrium is stable, but for horizontal displacements and for rotation about a vertical axis it is neutral For rotational displacement about a horizontal axis the equilibrium is stable, unstable, or neutral, according as the centre of gravity of the vessel is below, above, or at a point called the *metacentre* (q.v.). The laws of hydrostatics apply to gases as well as to liquids (*see* GASES, PROPERTIES OF).

Though hydrostatics in the first place applies to fluids at rest, its principles can be applied also to fluids in motion, provided that the whole of the fluid moves like a rigid body, and provided we assume fictitious forces acting on its particles, equal and opposite to those that would be required to impart to them their actual accelerations. Thus if a fluid rotates like a rigid body about a vertical axis, the 'centrifugal force' on each particle must be taken into

account. At the free surface, for example, the resultant of centrifugal force and of the earth's attraction (weight) must be normal to the surface. From this can be deduced that the free surface in this case is a paraboloid of revolution whose axis is the axis of rotation.

The effects of capillarity (q.v.) are in apparent contradiction with the laws of hydrostatics; the free surface, for example, is not a horizontal plane. But Laplace showed that these effects may be explained by the existence of forces of attraction between contiguous particles of the liquid, so that, taking such attractions into account, the free surface is always at right angles to the resultant force on the particle.

Illustrations of the principles of hydrostatics will be found in the articles on HYDRAULICS AND HYDRAULIC MACHINERY; ARCHIMEDES; BAROMETER; CAPILLARITY; DIVING-BELL; HYDROMETER; SPECIFIC GRAVITY.—BIBLIOGRAPHY: A. G, Greenhill, *Hydrostatics*; J. Greaves, *Elementary Hydrostatics*; R. H. Pinkerton, *Hydrostatics and Pneumatics*.

HYDROTHOR'AX, a dropsical condition of the pleura, in which the pleural cavity contains a serous fluid exuded from the blood-vessels, not due to inflammation. It may be the result of organic disease in the heart or kidneys, or of pressure on vessels obstructing the return of blood.

HYDROTROPISM. *See* CHEMOTROPISM.

HYDROZO'A, a class of animals forming a sub-division of the phylum Cœlenterata, and including the hydroid zoophytes, many of the smaller jelly-fishes (*medusæ*) a few corals, and certain extinct forms. They are nearly all marine, but perhaps the most familiar example is the little freshwater polype (Hydra), which has a tubular body not more than an inch long when fully extended, closed at one end (foot), and with an aperture (mouth) at the other. A number of slender radiating tentacles are present near the mouth, and these catch the food, which largely consists of minute crustacea.

The body-wall is made up of two cellular layers, an external *ectoderm*, and an internal *endoderm* bounding the digestive cavity. Between the two is a structureless membrane (*mesoglœa*). The ectoderm, especially that of the tentacles, is provided with numerous stinging-cells (*nematocysts*), from which poisoned threads can be shot out to paralyse the active prey. Reproduction is by budding (*gemmation*) during spring and summer, but sex-cells are produced in swellings of the ectoderm in autumn. The fertilized egg-cells develop into minute embryos which, enclosed in horny coats, remain dormant in the mud until the following spring.

Hydroid zoophytes are branching colonies of hydra-like individuals united by a common body (*cœnosarc*), and covered by a horny skeleton. Some of these such as Obelia, give rise to sexual buds, which become detached and swim away as little jelly-fishes (*medusæ*). The fertilized eggs of these develop into new fixed colonies. A life-history of this kind, where asexual and sexual stages alternate, is a good example of alternation of generations.

The medusa may be compared to an umbrella with a short handle (*manubrium*), at the end of which the mouth is situated. Owing to development of the mesoglœa the umbrella is somewhat thickened, and its margin is fringed with tentacles and provided with eye-spots or special sense-organs concerned with the maintenance of equilibrium. The mouth opens into a digestive cavity that traverses the manubrium and then expands into a sort of stomach, from which narrow canals radiate to the edge of the umbrella, where they join a circular ring canal. Swimming is effected by opening and shutting of the umbrella.

The following nine orders of Hydrozoa are distinguished: (1) Eleutheroblastea, including only the aberrant and almost cosmopolitan Hydra, of which three species are common in this country, the brown hydras (*H. vulgaris and H. oligactis*), and the green hydra (*H. viridis*). The colour of the last is due to the presence of minute Algæ in the endoderm, and this is a good example of *symbiosis*, where two organisms are intimately associated to the benefit of both. (2) Milleporina. Massive corals, millepores, which produce numerous simple medusæ. (3) Gymnoblastea-Anthomedusæ. The individual members of the colonial fixed stage are not sheltered in horny cups, and the sex-cells of the medusæ are developed in the manubrium. Sense-organs, eye-spots. The medusa stage may be reduced and not free-swimming. Examples: Podocoryne and Hydractinia (the fixed stage lives on shells inhabited by hermit-crabs, a case of commensalism); Tubularia, Coryne, Clava, Corymorpha, Pelagohydra (the asexual stage is free-swimming, and consists of a single individual). (4) Calyptoblastea-Leptomedusæ. Members of the colonial stage protected in cups, and the sex-cells of the medusæ developed on the floors of the radial canals. Eye-spots or balancing sense-

organs. This stage often reduced as in (3). Examples: Sertularia, Hydrallmania, Plumularia, Campanularia, Obelia. (5) Graptolitoidea. Extinct forms, somewhat resembling hydroid zoophytes, and characteristic of the older Palæozoic rocks. (6) Stylasterina. Branching corals without a free-swimming medusa stage. (7) Trachomedusæ and (8) Narcomedusæ include forms in which the asexual stage is reduced and the medusæ somewhat larger than those of preceding groups; (7) includes the interesting freshwater medusæ Limnocodium (in *Victoria regia* tanks) and Limnocnida (lakes Tanganyika and Victoria Nyanza). (9) Siphonophora, Free-swimming colonies (*see* special article).

HYÈRES (ē-ār), a town of Southern France, department of Var, 10 miles east of Toulon, beautifully situated on a declivity facing the Mediterranean. It is much frequented by patients suffering from chest or nervous disorders. Pop. 22,955.

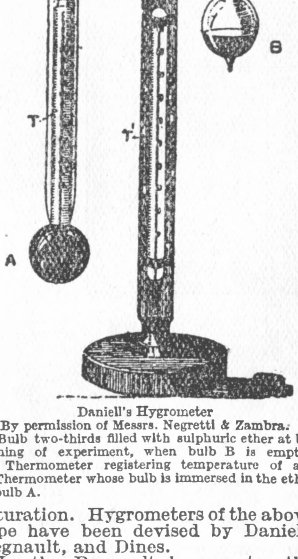
HYGIEIA (hī-ji-ē'ya), the Greek goddess of health, daughter of Asclepius, or Æsculapius, hence her temple was placed near that of Æsculapius, and her statues were even erected in it. She is represented as a youthful maiden with a bowl in her hand, from which she is feeding a snake, the symbol of healing. In 293 B.C. her cult was introduced into Rome, where she was known as *Valetudo*, or *Salus*.

HYGIENE. *See* DIETETICS; FOOD AND FOOD VALUES; PUBLIC HEALTH.

HYGROM'ETER, an instrument for measuring the amount of aqueous vapour in the air. Certain materials, such as catgut and hair, alter in length as the result of absorbing moisture from the air, and hygroscopes are made in which this property is employed. The toy Swiss chalet from which the figure of a man emerges in wet weather, and of a woman in fine weather, depends on the untwisting of a piece of catgut when it absorbs moisture, and is a rough and often tardy indicator of the humidity of the air.

In Saussure's instrument the changes in length of a hair cause a pointer to move over a scale and to indicate empirically the hygrometric state of the atmosphere In one form of hygrometer the aqueous vapour is absorbed from the air by passing a measured volume of air through tubes which contain a drying agent such as calcium chloride, phosphorus pentoxide, or pumice stone steeped in vitriol. The increase in weight of the tubes is found, and the number of grammes of water vapour present per unit of volume measures the absolute humidity of the air.

The fraction of saturation is found by dividing the result by the weight of vapour which a unit of volume *could* contain at the same temperature. In another class of instrument the air is cooled artificially until the contained vapour condenses on the instrument. The temperature at which this takes place is noted as the dew-point. By means of tables the maximum vapour pressures at the dew-point and at the temperature of the air are found, and their ratio gives the relative humidity or fraction of



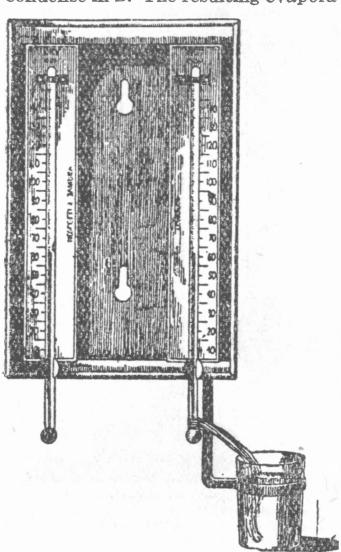
Daniell's Hygrometer
By permission of Messrs. Negretti & Zambra.
A, Bulb two-thirds filled with sulphuric ether at beginning of experiment, when bulb B is empty. T', Thermometer registering temperature of air. T, Thermometer whose bulb is immersed in the ether of bulb A.

saturation. Hygrometers of the above type have been devised by Daniell, Regnault, and Dines.

In the Regnault hygrometer the cooling is caused by the evaporation of sulphuric ether. A thermometer is placed within a closed thin silvered metal bulb which contains sufficient ether to cover the bulb of the thermometer. Air is then blown in by a tube, and bubbles up through the ether, thus causing evaporation and cooling. The mixture of air and ether vapour escapes by another tube. The air surrounding the bulb is gradually cooled, and, by observing the thermometer and the lower end of the bulb through a telescope, the temperature is noted at which dew begins

to appear. The air-current is stopped and the apparatus allowed to warm up. When the dew begins to disappear, the temperature is again noted, and the mean of the two temperatures is taken as the dew-point.

Daniell's hygrometer is used in a similar way. The bulb A is partly filled with ether, the bulb B and the tube connecting it with A containing at first only ether vapour. A muslin cloth moistened with ether is wrapped round B, and causes ether vapour to condense in B. The resulting evaporation from A into the tube cools A, on which dew condenses. The dew-point is then determined as with Regnault's instrument.



Standard Hygrometer
By permission of Messrs. Negretti & Zambra.

In the third type, known as the wet-and-dry-bulb hygrometer, there are two equal similar thermometers; the bulb of one of these is covered with thin muslin, which dips into a small dish of water and keeps the bulb wet. The cooling caused by evaporation causes the wet bulb to fall in temperature, and the lowering of temperature will depend on the dryness of the air. The dew-point lies in general below the temperature of the wet bulb, and is calculated from the observed difference of temperatures.

In the simplest method of calculation the difference of temperature between the two bulbs is multiplied by a factor taken from a table of Glaisher's factors; on subtracting the result from the temperature of the dry bulb, the dew-point is obtained. The fraction of saturation can then be found as before.

Greater accuracy is obtained by using a form of this instrument called the sling psychrometer, which can be whirled round by hand, thus ventilating the wet bulb more thoroughly. The dew-point is then calculated by means of a formula such as Apjohn's, or that of Ferrel, which is used by the United States Weather Bureau.

HYGROPHYTES, terrestrial plants which require abundant water-supply and a moist atmosphere, such as the shade-plants of tropical forests. The opposite of Xerophytes (q.v.).

HYKSOS, or **HYCSOS,** or Shepherd Kings, wandering tribes of Semitic descent, who conquered the whole of Egypt about 2100 B.C., and were driven out some five hundred years afterwards. The only detailed account of them in any ancient writer is a passage of a lost work of Manetho, cited by Josephus (*Kata Apionos*, i, 14). Manetho adds that "they are said to have been Phœnicians or Arabs." The Hycsos are therefore considered as nomadic Semites, either Arabs or Canaanites, but some historians suppose them to have been Turanians. Their epoch covers the thirteenth to the seventeenth dynasties.—Cf. J. H. Breasted, *A History of the Ancient Egyptians.*

HYÆLOSAU'RUS, a fossil reptile discovered in the Wealden formation of Tilgate Forest. Its probable length was about 25 feet. It is one of the Dinosauria, and, like many of that group, presents a structure intermediate between that of existing birds and reptiles.

HYMANS, Paul, Belgian statesman. He was born in Brussels in 1865 and, having attained distinction as a lawyer, was for a time professor in the University of Berlin, and wrote several books. In 1900 he was elected to the Chamber of Representatives, and in 1915 was sent as ambassador to London. In 1918 he became Foreign Minister, and represented Belgium at the Peace Conference of 1919. In 1920 he was chosen President of the first assembly of the League of Nations. In 1924–25, 1927–29 and 1929–32 he served Belgium again as Foreign Minister.

HY'MEN, or **HYMEN'ÆUS,** origin-

ally the Greek name of the marriage song; later the god of marriage in Grecian mythology. No marriage took place without his being invoked to sanction it. He is described as having around his brow the flowers of marjoram, in his left hand the flame-coloured nuptial veil, in his right the nuptial torch, and on his feet golden sandals. He is a taller and more serious Eros, and is accompanied by song and dance. He is represented as the son of Apollo and a muse, or less often as the son of Dionysus and Aphrodite.

HYMEN (Gr. *humen*, membrane), a thin membrane, also known as the maidenhead, partially covering the opening of the vagina. The belief that rupture of the hymen proves loss of virginity is fallacious.

HYMENIUM, in botany, a term applied in the Higher Fungi to a continuous layer of asci or basidia, such as is characteristic, for example, of Discomycetes and the majority of Basidiomycetes.

HYMENOMYCETES, a collective name for the higher groups of Basidiomycetous Fungi, from the Hydnaceæ upwards, but excluding the Gastromycetes.

HYMENOPHYLLACEÆ. *See* FILMY FERNS.

HYMENOP'TERA (Gr. *hymēn*, a membrane, and *pteron*, a wing) an extensive order of insects comprising bees, wasps, ants, ichneumon-flies, gall-flies, saw-flies, and allied insects. They are characterized by four membranous naked wings which have comparatively few veins. The second pair of wings is always smaller than the first. The mouth parts are provided with biting jaws and a suctorial organ. The head is freely movable, and besides the lateral compound eyes there are usually three ocelli on the top of the head.

The Hymenoptera undergo complete metamorphosis. Females have the extremity of the abdomen furnished either with an ovipositor, forming a boring organ (*terebra*), or a sting (*aculeus*). Hence the two sub-orders into which Hymenoptera are divided: Terebrantia, comprising the saw-flies, gall-flies, ichneumon-flies, &c., and the Aculeāta, which include the bees, wasps, ants, hornets, &c.

HYMET'TUS, a mountain in Attica, now called *Trello Vouni*, south-east of Athens, distinguished among the ancients for the excellence of its marble and its honey. The latter is still in repute.

HYMNS AND HYMN-WRITERS. An article on hymns should deal with the liturgical poems of all nations and creeds. In our short space, however, we must confine ourselves to Christian hymnody and to the part of it which is in use in this country. Here again we can only notice in passing the non-metrical parts of our liturgies, such as the *Psalms* and New Testament canticles, and the two non-Biblical prose poems the *Te Deum* and *Gloria in Excelsis*. In the narrower sense of metrical religious songs our hymnody has its roots in the Latin Church, and may be said to date from the fourth century and mainly from Ambrose, the great Bishop of Milan, and Prudentius, the first really Christian poet.

Of hymns by the former perhaps the best known is *Splendor paternæ gloriæ* (O Jesu, Lord of heavenly grace), while to the latter belongs the fine Christmas hymn *Corde natus* (Of the Father's love begotten). Amongst the most famous of later Latin hymns that are now in common use are *Vexilla regis prodeunt* (The royal banners forward go) by Venantius Fortunatus (sixth century), the two beginning *Pange, lingua* (Sing, my tongue, the glorious battle) and (Now, my tongue, the mystery telling), the first in honour of the cross and perhaps by the last-named author, the other eucharistic and by the great schoolman Thomas Aquinas (thirteenth century). To him also we owe another famous eucharistic hymn, *Adoro te devote* (Thee we adore, O hidden Saviour).

To these we may add the wonderful *Dies iræ* (Day of wrath! O day of mourning), which is generally ascribed to the follower and biographer of St. Francis, Thomas of Celano (thirteenth century), and *Veni Creator Spiritus* (Come, Holy Ghost, Creator, come), which in a rather loose translation has the unique honour of appearing in our prayer-books, and has been ascribed amongst other claimants to Charlemagne himself. Perhaps also with these should rank the *Stabat Mater Dolorosa* (At the cross her station keeping), dating perhaps from the twelfth century.

In *Hymns Ancient and Modern* about 20 to 25 per cent of the hymns are from the Latin, but it must not be supposed that all are ancient or mediæval. For instance, the popular *Adeste fideles* (O come, all ye faithful) is probably of the seventeenth or eighteenth century. Our hymn-books also owe something to German hymnody, as, for instance, *Nun danket alle Gott* (Now thank we all our God) and the harvest hymn *Wir pflügen und wir streuen* (We plough the fields, and scatter), but this element is small compared with the Latin, while the contributions of other

nations are smaller still. It may be observed that it is in connection largely with festivals and special occasions that the Latin and other foreign hymns have taken deepest root. On Easter Day the hymns most often heard in church are all wholly or partially of foreign origin.

When we turn to native hymnody, the first main fact to observe is that in the reformed Churches metrical versions of the *Psalms* and other parts of the Scriptures for long held sway. But the versions of Sternhold and Hopkins, followed by that of Tate and Brady, have little attraction for the present generation, and only a few such renderings as the *Old Hundredth* are in common use. Even the older and in some ways more beautiful versions of the 23*rd Psalm* have given way to *The King of Love my Shepherd is* of Sir Henry Baker, which is rather a meditation than a paraphrase. The Scottish version indeed far longer retained its hold in its own home, and is not displaced yet. Paraphrases of other parts of the Bible have still less currency. A remarkable exception is *When shepherds watched their flocks by night*, due to Tate himself.

Hymns are essentially for the people, and their permanent value must be judged by the hold they gain over the religious emotions rather than by the critical standards we usually apply to poetry. Judged on this principle, the sixteenth and seventeenth centuries produced little that has stood the test. The most remarkable specimen of the sixteenth century is the *Jerusalem, my happy home* of F.B.P. (Francis Baker, Priest?), which in various forms is common enough, though its real charm lies in the quaint verses which are rarely found in modern collections.

The name of George Wither (seventeenth century), who published a hymn-book of his own, should not be omitted, but little or nothing of his appeals to modern taste. In the same century Henry Vaughan's (the 'Silurist') *My soul there is a country* is sometimes used, but neither he nor the greatest of our religious poets, George Herbert, have somehow been able to touch that particular chord in the heart which the hymn appeals to. So, too, Herrick's *Sweet spirit, comfort me* has sometimes been placed in modern collections, but has probably been rarely sung.

The chief names of the seventeenth century are those of the great Nonconformist Richard Baxter, whose *Lord, it belongs not to our care* and *Ye holy angels bright* are deservedly well known, but not of first-rate popularity, and Thomas Ken, one of the 'Seven Bishops,' whose *Awake, my soul* and *Glory to thee, my God, this night* used to be known respectively as *the* Morning and *the* Evening hymn.

It is with the opening of the eighteenth century that the Golden Age of English hymnody begins. The first name is perhaps the greatest—that of Isaac Watts. There are probably in every collection more hymns by him than by any other author, unless it be Charles Wesley, and many of them have a very high place in the affections of hymn-lovers. First, perhaps, stand two which appeal to very different emotions, *When I survey the wondrous cross* and *O God, our help in ages past*, though there are many others which are general favourites.

Charles Wesley, who was some thirty years younger than Watts, is said to have composed 6,000 hymns, of which 500 are in use. It would be difficult to say which are either the best or the best known. Perhaps, on the whole, the palm should go to *Jesus, Lover of my soul* and *Lo! He comes with clouds descending*, and, above all, *Hark! the herald angels sing*. Though the first line and some others of the last-mentioned hymn are attempts to improve on Wesley, the whole is substantially his. And though no doubt it is largely the associations of Christmas and Mendelssohn's tune that give it its position, the fact remains that it is the most popular of English hymns.

Toplady (born 1740), though he wrote other hymns of merit, will always be known by one—*Rock of Ages*—the last verse of which, like the first of *Lo! He comes*, reaches a level of simple sublimity which gives it a high place in English poetry. William Cowper is perhaps the only great English poet who is also a great hymn-writer. In the latter capacity he is closely associated with his friend John Newton, in conjunction with whom he published the *Olney Hymns*. While Newton is best remembered by *How sweet the name of Jesus sounds*, Cowper gave us such famous hymns as *God moves in a mysterious way* and *Hark, my soul! it is the Lord*, and, above all, *There is a fountain filled with blood*, a poem which, though its images often repel, has had a vast influence on some forms of religious feeling.

When we come to the nineteenth century, probably most people would give the first place to John Keble. His *Christian Year* does not contain a single hymn in the proper sense of the word, but much material from which hymns may be drawn. The most obvious examples are his *New every morning* and *Sun of my soul*, taken

from his morning and evening meditations.

Bishop Heber's *From Greenland's icy mountains* is supreme as a missionary hymn. Two hymns written during the first half of this century are of extraordinary popularity, and at the same time raise interesting questions as to what are the qualities which make a great hymn. These two are Cardinal Newman's *Lead, kindly Light* and H. F. Lyte's *Abide with me.* Both are generally treated as evening hymns, but really describe thoughts and feelings alien to the minds of those who use them. Lyte's is a meditation on the close of life, Newman's on religious doubts and difficulties. Yet after all we may be glad that they are what they are in popular estimation.

Amongst the chief writers of this period or a little later we may perhaps place Horatius Bonar, the author of *Thy way, not mine, O Lord* and *A few more years shall roll.* Sarah Adams's *Nearer to Thee* is perhaps not so popular as it was, and it is remarkable that it drew down the scorn of a great poet and critic, Matthew Arnold, who took the lines *Out of my stony griefs, Bethel I'll raise* as an example of the worst doggerel. It may be here noted that this is the first time we have had to mention the name of a woman writer, and probably there are few of the front rank. Mrs. Alexander, the authoress of *The roseate hues* and *There is a green hill far away,* may perhaps be regarded as holding the first place among English woman hymnodists.

Whether the last fifty or sixty years have produced many great hymns, it is too early to judge. To the writer it seems that few which he did not know in childhood have really established themselves, and if he would make an exception, it would be in favour of Baring-Gould's *On the resurrection morning!* One thing it is necessary to say in conclusion. The number of hymns now in circulation is immense, and the list of hymn-writers and translators in the Index to Julian's *Dictionary of Hymnology* reaches to something like 4,000 names. Such a selection as has been here made must needs be largely a reflection of personal tastes, coloured by early associations, and is not therefore likely to be universally satisfactory.

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HYNDMAN, Henry Mayers, British economist and socialist leader, born in London 7th March, 1842, died 22nd Nov., 1921. Educated at Trinity College, Cambridge, he started as a journalist, and acted as correspondent for *The Pall Mall Gazette* during the Austro-Italian War in 1866, where he became the friend of Mazzini, Garibaldi, and other Italian patriots.

Between 1869 and 1871 he travelled in America, Australasia, and Polynesia, became an adherent of the socialistic theories of Marx, and founded the Social Democratic Federation in 1881. An active agitator for social reforms, he was tried at the Old Bailey in 1887 in connection with riots in London, but was acquitted.

He unsuccessfully contested Burnley

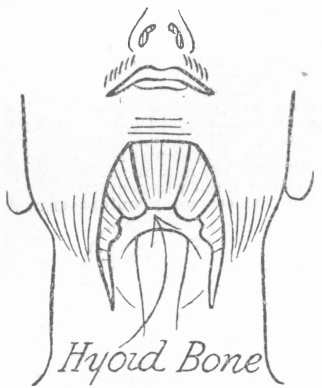
John Kebie

in 1895, 1906, and 1910. Hyndman was a vigorous agitator against the Boer War (1899–1902), but supported the British Government in their attitude during the European War. His works include: *Indian Policy and English Justice* (1874); *England for All* (1881); *Historical Basis of Socialism* (1883); *Economics of Socialism* (1896); *The Future of Democracy* (1915); *The Awakening of Asia* (1919); *Clemenceau: the Man and his Time* (1919); and *The Evolution of Revolution* (1920).

HYOID BONE, in anatomy, a bone shaped somewhat like the letter U, but with a wide bend and shorter limbs in proportion to the body, and having a pair of upward projections or lesser *cornua* (horns), the horizontal limbs of the U being called the *greater cornua.* It is suspended horizontally in the substance of the soft parts of the neck between the root of the tongue

and the larynx (Adam's apple). *See* LARYNX.

HYOSCYAMINE ($C_{17}H_{23}NO_3$), an alkaloid isomeric with atropine, and occurring with it in several plants, e.g. Deadly Nightshade (*Atropa Bella-*



Hyoid Bone

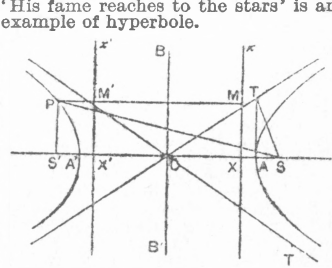
donna), Thorn Apple (*Datura Stramonium*), and in henbane (Hyoscyamus). It is extracted from the mother-liquor in the preparation of atropine, as it is more soluble in water and in alcohol than atropine. It crystallizes in minute silky needles of melting-point 108·5° C., and is lævorotatory, whereas atropine is inactive. Hyoscyamine is a strong poison. It is used medicinally in the form of its salts, and is given internally and subcutaneously. It dilates the pupil of the eye, and is used by oculists for the same purpose as atropine.

HYPA'TIA, a Greek woman, a philosopher of the eclectic school, the daughter of Theon, a celebrated astronomer and mathematician of Alexandria towards the close of the fourth century after Christ, at which period she was born.

Her father taught her not only all the usual branches of learning, but also geometry, astronomy, and finally philosophy. She acquired a great reputation in the last-named study, and as a lecturer in the school of Plotinus gathered a numerous auditory of students from all parts of the East. She was as virtuous and beautiful as she was learned. But the jealousy and intolerance of Cyril, the Patriarch of Alexandria, were aroused at the influence exercised by Hypatia; the lower and more ignorant clergy in particular were stirred against her, and at length a number of them, having excited a popular tumult, seized her as she was returning from the schools, dragged her through the streets of Alexandria, stripped her naked, and finally murdered her with circumstances of the greatest barbarity (415). She is the heroine of Charles Kingsley's romance *Hypatia, or New Foes with an Old Face.*

HYPER'BOLA, one of the conic sections (q.v.). In the figure, S is the *focus*, X*x* is the *directrix*, SX is perpendicular to X*x*, and PM is the perpendicular to the directrix from P on the curve, so that SP = *e*·PM. The constant *e* is called the *eccentricity*. The curve is symmetrical about SX, and also about a line B'CB perpendicular to SX. It has therefore another focus and directrix, S' and X'*x'*, so that S'P = *e*·PM'. SX meets the curve in the *vertices* A, A'. AA' is called the *transverse axis*, B'B the *conjugate axis*. The curve has two branches extending to infinity. The tangents from the *centre* C, which touch the curve at infinity, are the *asymptotes* CT, CT'; the curve approaches these lines indefinitely as it recedes from C. If AT, the tangent at A, meets an asymptote in T, then CT = CS, so that, if CA = *a*, and AT = *b*, we have $CS^2 = a^2 + b^2$. Since CS = *ae*, *e* is given by $a^2e^2 = a^2 + b^2$. In an *equilateral*, or *rectangular*, *hyperbola* *a* = *b*, and the asymptotes are at right angles. (*See* CONE; CONIC SECTIONS; GEOMETRY.)

HYPER'BOLE (-bo-lē), a rhetorical figure, in which an idea is expressed with a fanciful exaggeration of phrase which is not to be taken too literally, but only as representing a certain warmth of admiration or emphasis. 'His fame reaches to the stars' is an example of hyperbole.



HYPERBO'REANS, the name given in early Greek legend to a people who lived 'beyond (*hyper*) Boreas' or the north wind, and were not exposed to its blasts, but enjoyed a delightful climate and perpetual health. Their natural life lasted 1,000 years, and was spent in the worship of Apollo.

HYPERICA'CEÆ, or HYPERICI'NÆ, a nat. ord. of plants, of which the genus Hypericum or St. John's wort is the type. They are herbs, shrubs, or (rarely) trees, with simple, opposite (rarely whorled) leaves. They have terminal or axillary, solitary, cymose or paniculate flowers, usually yellow or white. These plants abound in resinous juice, and many of them possess medicinal properties.

HYPERI'DES, an Athenian orator, the pupil of Plato and Isocrates, born about 390 B.C. Along with Demosthenes and Lycurgus he was one of the leaders of the patriotic and anti-Macedonian party. As an orator he was specially distinguished for his grace and subtlety of expression, as well as for his tact in handling the question under consideration. He was murdered at Ægina by the emissaries of Antipater in 322 B.C. Of his orations one has reached us nearly entire; the others only in fragments.

HYPERION (hī-pēr-ī'on or hī-pē'ri-on), in the most ancient mythology of Greece, the god of the sun, afterwards identified with Apollo; also one of the Titans (q.v.).

HY'PERSTHENE, a black pyroxene (*see* AUGITE) crystallizing in the orthorhombic system. Its colour is brownish-black; through the development of minute mineral plates within it, it sometimes has an almost metallic sheen. It was first found on the coast of Labrador, and was called Labrador hornblende. It is a constituent of many andesite lavas.

HYPER'TROPHY, literally over-nourishment, is an excessive development of any part of the body or any of its organs by actual increase of the particular parts composing it, as increase of muscular fibre in the heart. It arises from continued oversupply of blood to the part, due it may be to chronic irritation of the part, as, for example, thickening of the skin in the neighbourhood of a chronic ulcer; or it may be due to excessive use of the part.

For example, one of the common forms of heart disease is the result of damage inflicted by disease on the valves, interfering with their efficiency. To compensate for their imperfect action the heart has to perform more work, and consequently its muscle becomes increased in bulk. Thus hypertrophy of the heart is a vital compensation for inefficient valves.

HYPHA, the name applied to any one branch of the filamentous thallus or *mycelium* of a fungus.

HYPHOMYCE'TES, the largest section of the Fungi Imperfecti, distinguished by their conidium-bearing hyphæ (conidiophores), being produced singly or in small tufts (not in layers, nor enclosed in special receptacles). Examples: Botrytis, Fusarium, Helminthosporium.

HYPNOT'ICS, a term applied to drugs or other agents that induce sleep. Thus a hot bath or a heavy meal, by deflecting the blood stream to the skin or the organs of digestion respectively, may reduce the blood-supply of the brain and so exert a hypnotic influence. To a sedentary town-dweller exercise in the fresh air of the country often has a very pronounced soporific effect. But most hypnotics are narcotic drugs that lower the excitability of the nerve-cells in the brain, and so help to induce sleep.

This result may be attained by numbing pain or discomfort that prevents the normal process of falling asleep, or it may be brought about by actual narcosis. For example, alcohol, if taken in sufficient quantity, may produce drowsiness or deep sleep; and many other poisons that have no specific pain-relieving properties can induce somnolence and unconsciousness.

The use of drugs to induce sleep is a practice that should be resorted to only under exceptional circumstances and on the advice of a medical man. After surgical operations or in patients suffering from incurable cancer it is often essential to relieve the pain by opium to permit sleep. But where insomnia is the result of worry, anxiety, or the memory of painful experiences it is inexcusable to resort to hypnotics to alleviate the distress, unless there are very special circumstances to justify such a course.

In such cases the use of drugs often only aggravates the trouble, and suggests to the patient at a time when his self-control is weakened a dangerous way of forgetting his troubles. Most cases of the drug-habit and habitual inebriety are the result of the abuse of hypnotics as agents for dulling anxiety.

HYP'NOTISM in its fully developed form is a condition of sleep induced in the subject by another person who by means of verbal suggestion, ocular stimulation, or mechanical gestures conveys to the former the conviction that he will really fall asleep. The fundamental difference between hypnotic and ordinary sleep lies in the fact that in the former the subject is apt to receive and act upon suggestions made by the hypnotizer. Thus, for example, the subject readily accepts the assurance of the hypnotizer on matters that do not come into violent conflict with his feelings and emotions; he will believe that a piece of wood is an apple if he is confidently

assured that such is the case, or he may lose neuralgic pains if he is persuaded that they are not real.

Moreover, he will carry out complicated actions at the suggestion of the hypnotizer, not only when he is actually in the hypnotic state, but at some future time (post-hypnotic suggestion). For example, to a subject under deep hypnosis the hypnotizer may say that at four o'clock on the following day he will drink a glass of water. When the subject awakes he may be quite unconscious of the instructions given him; yet at the appointed time he will put the suggestion into effect, fully believing it to be a perfectly spontaneous and voluntary act.

One of the most startling aspects of hypnotism is the means it gives the hypnotizer of tapping the stream of unconscious experience. For example, the subject at some earlier period of his life may have had an experience that excited such intense feelings of aversion as to compel him to make terms with himself, in other words, to secure peace of mind by repressing all memory of the disturbing episode. Under hypnosis such painful memories hidden away in what modern psychologists call 'the unconscious' can be unveiled and brought to light. But hypnotism opens the way for the recall of every kind of unconscious memory, pleasant or unpleasant. For example, the writer once hypnotized a man (who believed that he was totally ignorant of foreign languages) and suggested to him that he was seven years of age. The subject at once lapsed into a childish way of speaking, and gave a detailed account of every incident on a voyage from England to a school in Germany, and then began talking a babyish variety of German.

Hypnotism has been used therapeutically as a means of inducing sleep and anæsthesia, for creating in the minds of people over-addicted to drugs and alcohol an aversion from their particular poison, for recovering memory, and for overcoming pains such as neuralgias. But it is only in exceptional cases that its use is justifiable, and even then it must be employed with the utmost care and discretion, for the unveiling of forgotten experiences which are distressing and charged with emotional tone may upset a patient and do more harm than good; and hypnotism is a very potent instrument for exaggerating or even creating the types of emotional disturbance it is sometimes used to cure. Even in cases of dipsomania, where most dramatic results are sometimes obtained, the effects are usually transitory.

It is only a relatively small proportion of subjects that can be put into a state of deep hypnosis with complete loss of memory and subservience to the hypnotizer.

The term hypnotism was introduced by Braid of Manchester (1796–1860), but the phenomena had long been known under a variety of names, such as mesmerism and animal magnetism. The development of the verbal method of suggestion and of hypnotism was mainly due to the Nancy school of physicians (*see* Bernheim's *Suggestive Therapeutics*, 1892). Perhaps the best popular account of the subject is Moll's *Hypnotism* (1890); for the more recent attitude *see* W. H. R. Rivers, *Instinct and the Unconscious* (Cambridge, 1920).

HYPNUM, one of the largest genera of mosses, including above ninety species, natives of Britain. Many of the species are very large and ornamental.

HYPOCHLO'RITES, unstable compounds, the salts of hypochlorous acid, HClO, chiefly important as powerful oxidizing and bleaching agents; not, however, when pure, but when containing chlorides. The chief hypochlorites, or at least the complex substances which contain hypochlorites, are bleaching-powder, and the bleaching liquors made with potash and soda.

HYPOCHON'DRIA, a disordered state of mind, the sufferer from which lives under the generally groundless apprehensions of different diseases. Uninterruptedly occupied with the state of his body, he takes notice of every feeling, and wishes to have every trifling pain explained, considering every one as a symptom of a serious disease. For everything he wants physic.

Hypochondria is in itself not a dangerous state, although it makes the life of the sufferer a torment to himself and his friends. It is occasioned, as a rule, by worry and anxiety due to social or personal circumstances. The mental conflict created, for example, by financial embarrassment may affect the intellectual control of the emotions and render the victim an easy prey to those aches and discomforts which everyone experiences and the normal person disregards.

The condition of hypochondria is favoured by too sedentary a life, by sexual indulgence or excess in alcoholic liquors; and also by want of exercise of the physical and mental powers producing ennui. It can be cured by facing the underlying worries and anxieties and learning to regard them rationally, and also by the avoidance of the habits likely to

occasion it, by the adoption of a steady and regular life, with moderate exercise for the mind and body, and the help of cheerful society.

HYPODER'MIC INJECTIONS are the injections of various substances, in liquid or semi-liquid form, beneath the skin by means of a syringe fitted with a hollow needle. The syringe and needle should be sterilized before the substance to be injected is drawn inside the syringe, and the skin around the part selected should be painted with some antiseptic. For this purpose iodine is most frequently used.

After these preparations the needle should be rapidly introduced through the skin in a slanting manner so that it goes no deeper than through the skin itself, and the piston of the syringe then pushed slowly down to ensure that the liquid can pass through the narrow bore of the needle and enter the subcutaneous tissues. This method of administering drugs is now widely used when rapidity of action is required, to enable absorption of certain drugs to take place, for accuracy of dosage, and for any reason when it is not desirable to give drugs by the mouth.

HYPOG'YNOUS FLOWERS, those with the stamens and other outer parts inserted below the gynœcium, as buttercup, wallflower, campion, primrose, and tulip.

HYPOPHOS'PHITES, the salts of hypophosphorous acid. The hypophosphites are all soluble in water, and readily change to phosphites and phosphates in presence of air. The sodium salt NaH_2PO_2 and the calcium salt $Ca(H_2PO_2)_2$ are used medicinally. These must be completely soluble in water and free from phosphites, which are poisonous.

HYPOPHOS'PHOROUS ACID, H_3PO_2, an acid obtained by decomposing barium hypophosphite with sulphuric acid; by careful evaporation the acid may be obtained as a white crystalline mass. The salts of this acid were discovered by Dulong in 1816, and are formed when phosphides of the alkali metals or the alkaline earth metals are decomposed by water, or when phosphorus is boiled with alkali.

The barium salt $Ba(H_2PO_2)_2$ is the starting-point for the preparation of the acid or for the other salts. It is formed by boiling phosphorus with water and barium hydroxide. Sodium hypophosphite, NaH_2PO_2, and calcium hypophosphite, $Ca(H_2PO_2)_2$, are used medicinally. The acid is a strong reducing agent, and precipitates gold and silver from solutions of their salts, being itself transformed into phosphoric acid.

HYPOSUL'PHITES, or **HYDROSULPHITES,** the salts of hyposulphurous acid, sometimes termed hydrosulphurous acid, $H_2S_2O_4$. Sodium hyposulphite, $Na_2S_2O_4$, and calcium hyposulphite are the commonest of these hyposulphites. The sodium salt is usually prepared by reducing sodium bisulphite solution by metallic zinc, and removing the zinc by means of soda solution. Numerous patents have been taken out for the manufacture of the hyposulphites, and for a considerable time attempts have been made to prepare hyposulphite in a solid stable form. These attempts have not been successful, but stable compounds can now be obtained by uniting the salt with formaldehyde. Formaldehyde is united with sodium hyposulphite, potassium hyposulphite, calcium hyposulphite, &c., giving the corresponding double compound, and this is allowed to crystallize. According to the nature of the double compound, these have been given special trade names by the makers, e.g. 'Hydraldite,' 'Eradite,' 'Rongalite,' 'Hydrosulphite NF,' &c. These stable compounds are used by dyers, and in most cases they act as well as the salts themselves.

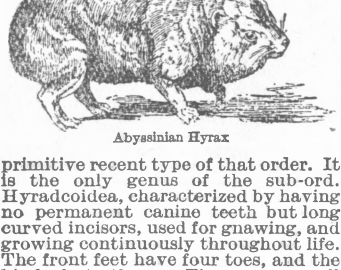
The hyposulphites are strong reducing and bleaching agents, and are easily oxidized by the air. They are used for bleaching textiles such as feathers, horsehair, leather; as reducing agents in indigo vats, as they reduce indigo blue to indigo white; in printing fabrics as a discharge for colours; and for bleaching oils and soaps. Hyposulphite of soda is used for "fixing" photographic negatives and prints.

HYPOTH'ESIS (Gr. *hypo*, under, and *thesis*, putting; groundwork, foundation), etymologically a supposition, is popularly used to denote something not proved, but assumed for the sake of argument. In scientific and philosophical usage it denotes either a probable theory of phenomena not yet fully explained, or a strictly scientific theory which accounts for all the known facts of the case, and which only needs the verification of subsequent observations and deductions to become a certainty. Thus the conjecture of Newton that the force of gravity, as exemplified on the earth, might extend to the moon, was in its first stage a probable hypothesis; but when it was found to account for all the facts, it became a scientific hypothesis or theory.

HYRACOTHE'RIUM, a genus of fossil ungulates, belonging to the odd-toed division, and of very primitive type. It is regarded as one of the earliest predecessors of the horse, and

occurs in Lower Eocene strata in Europe, including England, and America. The species are of the size of a hare.

HY'RAX, or **PROCAVIA**, a genus of hoofed mammals, and the most



Abyssinian Hyrax

primitive recent type of that order. It is the only genus of the sub-ord. Hyradcoidea, characterized by having no permanent canine teeth but long curved incisors, used for gnawing, and growing continuously throughout life. The front feet have four toes, and the hind feet three. They are small animals, often known as conies (coneys), native to Africa, Syria, and Arabia. The Cape hyrax is by the colonists of South Africa called *Rock-badger* and *Rock-rabbit*.

HYRCA'NIA, a province of ancient Asia, corresponding to what are now the northern parts of Khorasan and Mazanderan, along the Caspian Sea.

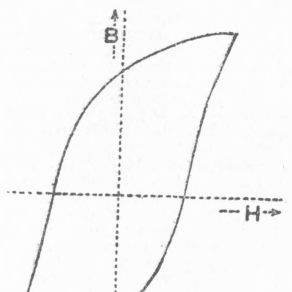
HYRCA'NUS, the name of two Jewish high-priests and rulers of the Asmonean family.—John Hyrcanus, the son and successor of Simon Maccabæus, assumed the title of prince and high-priest in 137 B.C., freed Judæa from the yoke of the Syrians, and founded a dynasty of rulers which lastedtill the accession of Herod. He also subjugated the Samaritans and Idumæans. He died 105 B.C., leaving five sons, two of whom, Aristobulus and Alexander, afterwards governed with the title of kings.

John Hyrcanus II, grandson of the former, was appointed king in Jerusalem, but was forced by his brother Aristobulus to retire into private life. Pompey, however, appointed him high-priest in 63 B.C. About 40 B.C. he was taken prisoner by the Parthians and carried with them to Seleucia. Here he remained till he was invited to Jerusalem by Herod, son of Antipater. Being suspected of plotting against Herod, he was put to death 30 B.C.

HYSSOP (Hyssŏpus), a genus of plants of the nat. ord. Labiatæ. The common hyssop (*Hyssŏpus officinālis*) is a perennial shrubby plant rising to the height of 2 feet, a native of Siberia and the mountainous parts of Austria, but common in English gardens. It flowers from June to September. The leaves have an agreeable aromatic odour, and a slightly bitter and somewhat warm taste. It was once employed as a medicine, but has now fallen into disuse. The hyssop of Scripture (the symbol of spiritual purification from sin) is generally identified with the caper (*Cappăris spinōsa*).

HYSTERESIS (from a Greek word *hysterein*, meaning 'to lag') is the name given to a certain magnetic phenomenon. The state of magnetization of a piece of iron can be recorded by drawing a graph of its 'magnetic induction' (B) corresponding to the applied 'magnetic force' (H). (*See* MAGNETISM.) If the magnetic field (or force) is an alternating one, the magnetic induction does not have precisely the same value, for any given value of the applied magnetic field, as it would have if the field were a steady one.

When the applied magnetic field is getting weaker, the magnetic induction is greater than it would be with a steady field of the same value, and when the magnetic field is getting stronger, the magnetic induction is lower, so that changes in the magnetic induction 'lag behind' those in the applied field. The result is that the iron goes through a cycle of magnetization which can be represented by a curve (*see* fig.). The area of this



curve is proportional to the amount of energy which is given to the iron per cycle, and dissipated in it as heat energy. A vast amount of experimental work has been done to determine the law of 'hysteretic loss.' The best experiments agree with the following law, which is known as Steinmetz's Law.

If w is the loss in ergs per cubi

centimetre per cycle, η a constant, B *the maximum magnetic induction in lines per square centimetre, then* $w = \eta B^{1\cdot6}$. The value of the constant η varies a great deal with different materials, and it is obviously a highly important point in electrical engineering to discover irons possessing low hysteretic losses. One of the best of such armature irons is known as 'stalloy' iron, which is an iron containing 3½ per cent of silicon. It has a hysteretic constant of about 0·0007.

Example: The armature core iron (stalloy) of a D.C. generator weighs 1,000 lb. It is a 6-pole machine, running at 500 r.p.m. The maximum magnetic induction in the iron is 100,000 lines per square inch; find the hysteretic loss.

$$B = \frac{100{,}000}{2\cdot54^2} = 15{,}400 \text{ lines per sq. cm.}$$

Since 1 Joule = 10^7 ergs and 1 watt = 1 Joule per second.

Loss in Watts = $0\cdot0007 \times 15{,}400^{1\cdot6} \times$ vol. of iron in c. c. × cycles per sec. ÷ 10^7.

∴ Loss in Watts =

$$\frac{0\cdot0007 \times 15{,}400^{1\cdot6} \times 150}{2\cdot205 \times 7\cdot86 \times 60} = 506\cdot2.$$

—Cf. C. P. Steinmetz, *Alternating Currents.*

HYSTE'RIA (Gr. *hystera,* womb), a term applied to a peculiar functional nervous disorder in members of either sex that sometimes follows some intense emotional disturbance, such as a blighted affection in an adolescent girl, or the exposure to the risk of death in a railway accident, or the anxieties of modern warfare. At one time the affection was supposed to be peculiar to women and to be due to some disorder of the womb, which in ancient times was supposed to be able to wander about the body and produce the remarkable local manifestations of the ailment. But the term hysteria was probably first applied to the emotional state into which devotees of the goddess Aphrodite became worked up in the orgies that took place on New Year's Day when the annual festivals of the goddess were celebrated.

The condition to which the term is applied in modern medicine is peculiarly liable to develop in girls during the period of adolescence, and especially as the result of some intense emotion of a sexual nature. The patient is peculiarly prone to sudden emotional storms, ending in tears or laughter, or in severer cases in a fit that may simulate an epileptic attack. But localized or widespread paralysis or weakness of muscles may occur, and especially modifications of the sensitivity of the skin, either localized or general anæsthesia or hyperæsthesia. Loss of voice, deafness, or temporary loss of any of the special senses may also occur.

A well-known form of hysteria that may occur in either sex is the disorder known as *railway-spine.* A passenger in a train which has been in a collision may at some time after the accident develop paralysis or sensory disturbances without any physical injury to account for them. In the European War many thousands of soldiers, as the result of the stress and strain of the terrible conditions of modern warfare, fell victims to hysteria (shell-shock) and developed mutism, functional deafness or blindness, paralysis of localized groups of muscles, and all sorts of disturbances of sensation. Such conditions are the result of the prolonged strain which is involved when men are constantly in danger of sudden death. It occurs especially among men in the ranks, who are used to obey orders or suggestions and are not subject to the mental strain of their commanding officers, who have to make decisions and give orders. The latter are liable to become the victims of anxiety-neurosis, whereas the former find relief from the strain in the paralyses and anæsthesias of hysteria.

The only rational treatment of hysteria is that based upon the analysis of the symptoms and the revelation of the true cause of the trouble. But good food and rest are important adjuvants in the treatment; and the patient should be placed under such conditions as will shield him or her from all emotional excitement or from any circumstances likely to reawaken the original cause of the disturbance. Drugs and isolation are dangerous palliatives that are likely to do more harm than good in most cases.—Cf. W. H. R. Rivers, *Instinct and the Unconscious.*

HYTHE (hith), a parliamentary and municipal borough of England, one of the Cinque Ports, in the county of Kent, 11 miles W.S.W. of Dover, to the west of Folkestone, at the foot of a steep hill or cliff. It was anciently a place of great importance; but its harbour has become partially blocked. The British army school of musketry, which was here for many years is now the School of Small Arms. A promenade over 5 miles along the coast was opened in 1881. A canal built for military purposes flows through the town. Hythe unites with Folkestone in sending one member to Parliament. Pop. (1931), 8,397.

I

I, the ninth letter and third vowel of the English alphabet, in which it represents not only several vowel sounds but also the consonantal sound of *y*. The two principal sounds represented by it in English are the short sound as in *pit, pin, fin*, and the long as in *pine, fine, wine*, the latter being really a diphthongal sound. It has also three other sounds, viz. that heard in *first, dirk* (ė, the neutral vowel); that heard in *machine, intrigue* (which, however, can scarcely be considered a modern English sound); and the consonant sound heard in many words when it precedes a vowel, as in *million, opinion, trunnion*. I and J were formerly regarded as one letter.

IAMBLICHUS (ī-am′bli-kus), a Greek Neo-Platonic philosopher, a native of Chalcis in Cœle-Syria, who flourished in the beginning of the fourth century after Christ. He was the pupil of Porphyry, and having become perfect in the doctrines of the Plotinian school, he taught with vast reputation. His school produced many eclectic philosophers, who were dispersed throughout the Roman Empire. His philosophical works now extant are: a *Life of Pythagoras*; an *Exhortation to the Study of Philosophy*; *Three Books on Mathematical Learning*; a *Commentary upon Nicomachus' Institutes of Arithmetic*; and a *Treatise on the Mysteries of the Egyptians, Chaldeans, and Assyrians*. He died at Alexandria about 333.

IAM′BUS, in prosody, a foot of two syllables, a short and a long one (⏑ –), or an unaccented syllable followed by an accented one. The iambic metre is the fundamental rhythm of many English verses. The verse of five iambic feet is a favourite metre, being the heroic verse of English, German, and Italian poetry.

IAN′THINA (Gr. *ianthinos*, violet-coloured), a genus of oceanic gasteropodous mollusca, with a thin violet-coloured snail-like shell. When irritated, they pour out a violet secretion, which serves for concealment, in the manner of the ink of the cuttle-fish.

IB′ADAN, a town of Western Africa, in the colony of Lagos, 122 miles from Lagos by railway. Pop. 175,000.

IBAGUÉ (ē-bȧ-gȧ′), a town of South America, Republic of Colombia, department of Tolima. There are sulphur- and silver-mines in the vicinity. Pop. 56,333.

IBAÑEZ, Vicente Blasco, Spanish politician and novelist, born 1867. Politically he was of revolutionary principles, and a powerful advocate of social reforms in Spain. Among his best works (in English) are: *The Matador*; *The Four Horsemen of the Apocalypse*, an extraordinary war novel, first translated in 1918; *Mare Nostrum*; *The Shadow of the Cathedral*; *Blood and Sand*; *The Torrent*; &c. *Spain under Military Terror*: *Alfonso XIII Unmasked* was translated into English in 1925. His works portray vividly daily life of Southern Spain. He died in 1928.

IBAR′RA, a town of Ecuador, in South America, capital of the province of Imbabura, at the foot of the volcano of the same name, 30 miles north of Quito. It was almost entirely destroyed by an earthquake in 1868. Pop. estimated at 6,000.

IBE′RIA, in ancient geography: (1) A fertile district in Asia, between the Euxine and Caspian Seas, which consisted of a plain surrounded by mountains, a part of modern Georgia. (2) An ancient name of Spain, from its river, the *Ibērus* (Ebro). The Iberi or Iberians, probably the most ancient European nation, formed the basis of the population of Italy, Gaul, Spain, and Lusitania (Portugal). Their language still lives in the Basque. The Celts, who entered the country later, were intermingled with them, the conjoined people being called Celtiberians.

I′BEX, a name of two or three species of goats. The horns of the male are flattened, have two longitudinal ridges at the sides, and are crossed by numerous transverse knots. The horns of the female are short, more erect, with three or four knots in front. The best-known varieties are the *Capra ibex* of the Alps and Apennines, the steinbock of the Alps, and the *C. pyrenaica*, the Pyrenean steinbock. Another species, *C. ægagrus*, the Persian wild goat, inhabits the lofty rocky peaks of the Caucasus Mountains, and ranges from there to Sind. Concretions found in its stomach were formerly of repute as antidotes against poison, under the name of 'bezoar stones.'

IBICUI (ib′i-kụ-ē), a river of Brazil,

which rises in the Serra de Santa Anna, state of Rio Grande do Sul, and joins the Uruguay after a course of 400 miles.

I'BIS, a genus of birds allied to the storks, and the type of a special family (Ibididæ), the most remarkable species being the *Ibis æthiopica,* or sacred ibis. This is found throughout Africa. It is about the size of a common fowl, with head and neck bare, and white plumage, the primaries of the wings being tipped with black and the secondaries being bright black, glossed with green and violet. It was one of the sacred birds of the ancient Egyptians, and was usually mummified. The cause of its being deemed sacred was no doubt because it appeared in Egypt with the rise of the Nile; but it is now rare in that country, living farther south. Related species are found in Madagascar, South Asia, and the Australian regions. Of allied forms may be mentioned: scarlet and white ibises of tropical America (*Eudocimus ruber* and *E. albus*), the glossy ibis (*Plegadis falcinellus*) ranging through most of the Old World, and the straw-necked Australian ibis (*Carphibis spinicollis*). Spoon-bills (Platalea, &c.) belong to the same family.

Persian Wild Goat (*Capra ægagrus*)

IBN-BATU'TA, an Arabic traveller born at Tangiers 1304, died at Fez 1377. He visited Egypt, Syria, Arabia, Persia, Central Asia, India, China, the Eastern Archipelago, East Africa, Central Africa, &c., and wrote an account of his travels.

IBRAHIM PASHA, an adopted son of Mehemet Ali, Viceroy of Egypt, born in 1789, died in 1848. He first gave signal proofs of his courage and military talents in the war with the Wahabis of Arabia, whom he completely defeated, and in the subjugation of Sennaar and Darfar. In 1825 he invaded the Morea at the head of an Egyptian army, with the view of

Sacred Ibis (*Ibis æthiopica*)

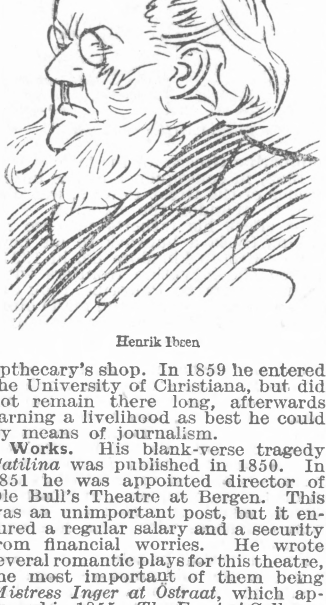
conquering Greece for his father; but in 1828, in consequence of the interference of the Great Powers, was obliged to abandon the attempt.

To effect his father's purpose of making Syria a bulwark to his new Egypto-Cretan kingdom he, in 1831, crossed the Egyptian frontiers with an army, overran Palestine, took St. Jean d'Acre by storm, and made himself master of all Syria. The campaign terminated by an arrangement in which the Porte ceded Syria, and conferred the pashalic of Adana, by a kind of lease, personally on Ibrahim. In no long time war with the Sultan again broke out, and resulted in a great defeat of the Turkish forces at Nizbib in 1839. By the interference of the Great Powers Ibrahim was eventually obliged, after retiring from all his Syrian conquests, to return to Egypt, marching across the desert from Damascus with great loss and suffering.

From this time he seldom appeared in public life, and employed himself chiefly in the improvement of his own estates. In 1846 he visited England and France. In 1848 Ibrahim, after his father had become imbecile, proceeded to Constantinople, and was nominated Viceroy of Egypt, but he died in the same year at Cairo, while Mehemet Ali was still alive. He

was succeeded by Abbas Pasha, the favourite grandson of Mehemet Ali.

IB'SEN, Henrik, Norwegian dramatist and poet, was born on the 20th March, 1828, and died on the 23rd May, 1906. His father was a business man who went bankrupt when Ibsen was eight years of age. Ibsen's great-grandmother was Scottish, and his grandmother and mother were German. On account of his father's insolvency Ibsen had an unhappy boyhood and youth, which helped to make him somewhat soured and bitter. He had only a very brief education at a scientific school at Skien, and from his sixteenth to his twenty-third year he drudged in an



Henrik Ibsen

apthecary's shop. In 1859 he entered the University of Christiana, but did not remain there long, afterwards earning a livelihood as best he could by means of journalism.

Works. His blank-verse tragedy *Catilina* was published in 1850. In 1851 he was appointed director of Ole Bull's Theatre at Bergen. This was an unimportant post, but it ensured a regular salary and a security from financial worries. He wrote several romantic plays for this theatre, the most important of them being *Mistress Inger at Östraat*, which appeared in 1855. *The Feast at Solhaug*, a tragedy, appeared in 1856. In the next year Ibsen returned to manage the National Theatre at Christiania, and soon produced a fine saga-drama, *The Warriors in Helgeland*, which is based upon Icelandic legends.

A very clever drama in rhyme, *Love's Comedy*, was published in 1862, and two years later appeared *The Pretenders*, another fine saga-drama in prose. In 1862 Ibsen's theatre became bankrupt, and he vainly attempted to obtain a pension from the Government. He left Norway in 1864, and did not return permanently until 1892, living in the meantime at Rome, Dresden, and Munich. In 1866 his pension was granted by the Government, and he was able to live in comparative comfort.

In the same year he published his magnificent poem *Brand*, in which he depicts an austere clergyman who will not compromise with anything which he considers to be evil. *Peer Gynt*, which is in a sense complementary to *Brand*, appeared in 1867. If Brand was strong-willed to a fault, Peer Gynt is just the opposite, weak-willed, devoid of enthusiasm, nurtured on fairy-tales, and egotistic. He represents Ibsen's idea of a typical Norwegian of the day. *Peer Gynt* is the most polished of all Ibsen's poetical works; it is full of variety, and of a wealth of imagination and poetry. It was the first of Ibsen's works to carry his reputation beyond the boundaries of Norway.

In 1869 Ibsen produced his first realistic prose play, *The League of Youth*. This is a political comedy, immature in some respects, but in others foreshadowing some of his later masterpieces. In 1873 he published the last of his historical plays, the immensely long *Emperor and Galilean*, which deals with Julian the Apostate and his struggle with Christianity.

After this Ibsen began his series of social plays, which were at the beginning more or less completely matter of fact and realistic, but which became more and more mystical in tone as the poet grew older. *Pillars of Society* (1877) deals with the hypocrisy of a prosperous middle-class family. It is somewhat immature; Ibsen did not shake himself free from the influence of Scribe and his school for some time.

A Doll's House (1879) was written to shock the conventionally-minded by means of new ideas about women's rights and privileges. It succeeded in its object, and still remains the most discussed of Ibsen's plays. Nora, the heroine, was the first to air the theory that a woman has a duty to herself as well as to her parents and her husband. *Ghosts* (1881) is a play which deals mainly with the question of heredity and which introduces disease as a factor in the plot. It was ferociously attacked on its appearance in Norway.

An Enemy of the People (1882) is a

companion-piece to *Ghosts*, since it was written as a protest against the reception of that play. Though it is a polemical piece of writing, it is perhaps the most agreeable of Ibsen's society plays. Doctor Stockmann, the hero, is the most sympathetic character in all the plays. There is an allegory running through this play and foreshadowing the mysticism of the latter plays.

The Wild Duck (1884) is a masterpiece of construction. In *Rosmersholm* (1886) the retrospective method is used more skilfully than anyone had used it since Sophocles wrote the *Œdipus Tyrannus*. *Rosmersholm* is a tragic play, but it is not petty or bitter as some of the other plays are. It has claims to be considered Ibsen's masterpiece.

The subsequent plays become more allegorical and less realistic. *The Lady from the Sea* (1888), unlike most of the plays, has not been overrated by the critics; it is, however, in many respects a better play than its successors. It hinges upon the idea that anyone who has perfect freedom to choose his course of action will choose to do what is right. *Hedda Gabler* (1890) depicts a type of modern woman who is afraid of motherhood, and who commits suicide because she cannot satisfy her petty social ambitions.

The Master Builder (1892) is acclaimed by some critics as Ibsen's masterpiece, while others find it quite devoid of meaning. It is an unsatisfying compromise between allegory and realism. It has been responsible for producing much ill-considered criticism. *Little Eyolf* (1894), like *A Doll's House*, deals with the problems of married life, but it is written in a more mature style.

John Gabriel Borkman (1896), is the last of the great plays. In *When We Dead Awaken* (1900) there are clear traces of Ibsen's mental collapse. In 1901 he broke down completely, and grew steadily worse until he died in 1906.

Appreciation. Ibsen's work, which is repellent in some respects, has in other ways been most beneficial to European drama. It has had an immense influence on the modern theatre, an influence far greater than that of any other dramatist of the nineteenth century. Ibsen's mature plays are masterpieces of technique; his dialogue is natural and life-like, and his plots have the inevitability of Greek drama. Ibsen did much to aid the stage of some of its absurd conventions, such as soliloquy and the aside. In all these respects his influence has been entirely for good.

As a moral teacher he has been less successful. He is too apt to vex and irritate, to destroy without reconstructing, and to raise questions to which he can supply no answer. His characters are often abnormal, and many of his plots morbid and removed from the high road of life.—BIBLIOGRAPHY: E. Gosse, *Life of Henrik Ibsen*; G. B. Shaw, *The Quintessence of Ibenism*; H. H. Boyesen, *A Commentary on Ibsen*; G. Brandes, *Björnson och Ibsen*; H. Rose, *Ibsen: Poet, Mystic, and Dramatist*; A. S. Rappoport, *Ibsen, Nietzsche, and Kirkegaard* (in *New Age*, 1906).

IB'YCUS, a Greek lyric poet, born at Rhegium, Italy, in the sixth century B.C.; lived mostly at Samos in the court of Polycrates. When about to be murdered by robbers, he declared that cranes flying overhead would avenge him; and an involuntary utterance by one of the ruffians on seeing a flock of cranes led to their seizure, confession, and execution. His poetry was chiefly erotic, but is known only by fragments.

I'CA, a coast department of Peru; area, 8,596 sq. miles; pop. 120,003.—Its capital, Ica, lies in the fruitful valley of the River Ica; pop. 20,000.

ICE, water frozen into a solid mass. Ice crystallizes in hexagonal plates or short columnar prisms, and in six-rayed star shapes in snow. It has a specific gravity of ·918, possesses the property of double refraction, and has a mean refractive index of 1·309 for yellow light. Water freezes when its temperature is reduced below a certain point, which is by universal consent made a fixed point on thermometers. That point is called zero on the Centigrade and Réaumur scales, and 32° on the Fahrenheit scale.

Water near the freezing-point presents the curious anomaly of expanding instead of contracting as the cooling process goes on. At 4° C. (39·2° F.) water has its maximum density-point. At temperatures below 4° the volume of the water increases as the temperature falls, and decreases as the temperature rises; and at the moment of solidifying the volume of the mass suddenly increases by about 9 per cent, so that ice at the temperature of freezing is one-eleventh greater in bulk than the water from which it is formed is at 4°. It is on this account that water freezes at the top first, and that ice when frozen floats at the top of the water.

The temperature at which pure water becomes ice is very nearly constant under ordinary circumstances; and it is this fact, along with the ease of procuring water at the freezing temperature, or rather ice at the point of liquefaction, that has caused this temperature to be adopted as one of

the fixed points in thermometers. The freezing-point is, however, slightly influenced by pressure. Increase of pressure lowers it, and the removal of pressure raises it. Salt water requires a lower temperature to freeze it than fresh water, and in the process a large part of the salt is rejected. Hence water obtained from the melting of sea-ice is nearly fresh. If water is kept perfectly at rest, it may be reduced in temperature far below the freezing-point without turning into ice; but particles of solid matter such as dust must also be kept from falling into it.

Iceberg breaking off from end of Glacier

The expansion of water on its conversion into ice often gives rise to the exhibition of very great force, and produces very remarkable effects in nature. Much of the disintegration observed in rocks and stones during or immediately after frost is due to it, water having entered into their pores and cavities and burst off particles by its expansion.

Ice, though it is very hard and brittle, possesses the property of plasticity to a very remarkable degree, and can be moulded into any form by the application of pressure. The plasticity of ice is a property of very great importance. It was discovered by Forbes, who explained the motion of glaciers by it. (*See* GLACIERS.) In nature ice appears in the greatest masses in the form of glaciers and icebergs, the latter being portions which have become detached from glaciers that extend down into the sea.

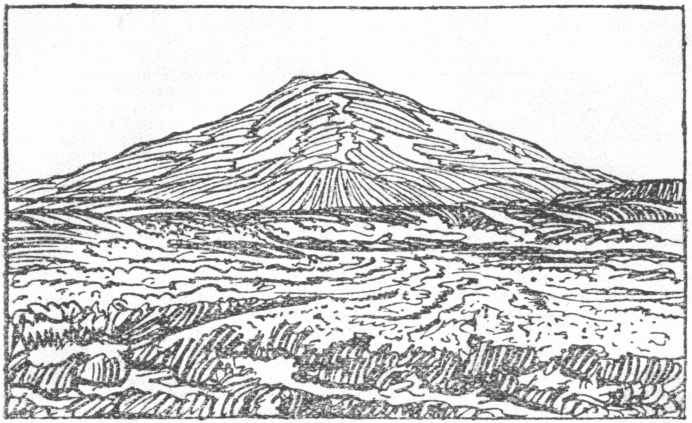
Ice is now an article of considerable importance from a commercial point of view, large quantities of it being shipped to warm climates from countries where it is naturally produced in abundance in winter, as the United States or Norway. Ice can now be made cheaply by certain processes and apparatus (*see* ICE-MAKING AND REFRIGERATION), and a very pure and excellent article is thus produced.

ICE AGE, in geology, an epoch during which a lowering of temperature has occurred over large regions, and perhaps over the whole of the earth, so that the precipitation of atmospheric moisture in the solid form has caused a marked extension of snowfields and glaciers over the surface. *See* GLACIAL EPOCH.

ICEBERGS, large masses of ice floating in seas or lakes, and originating in the breaking up of land-ice on a shore-line, particularly where glaciers are pushed out towards the sea. The

glacier, undermined by the warmer water, and floated upwards as its front protrudes, is said by whalers to 'calve,' as huge masses break off along the vertical cracks, accompanied by showers of fragmental ice.

The Arctic icebergs are well known off the mouth of the St. Lawrence, where, in foggy weather, they form a great menace to shipping. They tower up out of the sea in fantastic forms, with about seven-eighths of their bulk below water. The numerous air-bubbles in glacier ice, and the density of sea-water, cause them to rise higher above the surface than would be the case with lake-ice in fresh water. The Antarctic glaciers, which may be several miles in length, are typically



The Volcano of Hecla, Iceland

huge tabular masses, increased by sea-water freezing on their bases, and in part formed on an ice-front that has been pushed out far seaward from the land.

Floe-ice arises from the freezing of the sea, and a large part of the *pack-ice* of polar seas consists of floes broken by wave-action, masses becoming heaped on one another. Icebergs distribute a considerable quantity of material on the sea-floor, particularly blocks of rock gathered into the lower portions of the glaciers from which they have been formed.

ICELAND, an island under the same sovereignty as Denmark, situated between the North Atlantic and the Arctic Oceans, 250 miles from Greenland and about 600 miles west of Norway; greatest length, east to west, 306 miles; central breadth, about 200 miles; area with adjacent isles, 39,709 sq. miles; pop. (1931), 109,719. In shape it somewhat resembles a heart with its narrowest point turned south. The coast-line for a considerable extent on the south-east is almost unbroken, but in all other directions presents a continued succession of deep bays or flords and jutting promontories, thus affording a number of natural harbours.

The interior has generally a very wild and desolate appearance, being covered by lofty mountain masses of volcanic origin, many of them crowned with perpetual snow and ice, which, stretching down their sides into the intervening valleys, form immense glaciers. These icy mountains, which take the common name of Jökul, have their culminating point in Örœjökull, which is situated near the southeast-coast and has a height of 6,409 feet. Among the volcanoes the most celebrated is Mount Hecla, in the south, about 5,000 feet high. Numerous hot springs or *geysers* are scattered throughout the island, but are found more especially in the south-west, to the north-east of Reykjavik. (*See* GEYSERS.)

There are numerous lakes and rivers. The most valuable mineral product is sulphur, of which the supply appears to be inexhaustible; the other minerals deserving of notice are chalcedonies, rock-crystals, and the well-known double-refracting spar, for which the island has long been famous. There is a kind of brown coal which to some extent serves as fuel.

The climate is mild for the latitude, but the summer is too cool and damp

for agriculture to be carried on with much success. In the southern parts the longest day is twenty hours, and the shortest four, but in the most northern extremity the sun at midsummer continues above the horizon a whole week, and of course during a corresponding period in winter never rises.

Vegetation is confined within narrow limits. Almost the only tree is the birch, which has a very stunted growth, the loftiest hardly exceeding 10 feet. There are various flowering plants, among which saxifrages, sedums, and thrift or sea-pink are common. Heath and bilberry cover large stretches. Among mosses or lichens are the edible Iceland-moss (q.v.). Cole, potatoes, turnips, radishes, and similar roots thrive tolerably well. But by far the most valuable crop is grass, on which considerable numbers of live stock (sheep,

Original type of peat house, Iceland

cattle, ponies) are fed. The reindeer, though not introduced before 1770, has multiplied greatly and forms large herds in the interior; but they are of little importance economically. Wildfowl, including the eider-duck whose down forms an important article of commerce, are abundant; the streams are well supplied with salmon, and on the coasts valuable fisheries of cod and herrings are carried on. Manufactures are entirely domestic, and consist chiefly of coarse woollen goods, mittens, and stockings. The exports are wool, oil, fish, horses, feathers, worsted stockings and mittens, sulphur, and Iceland-moss. There are no railways but 800 miles of good road.

The inhabitants are of Scandinavian origin, descendants of the ancient Vikings, and speak a Scandinavian dialect, which still represents the old Norse or Norwegian in great purity. There is a university at Reykavik.

Constitution. The Constitution of Iceland is embodied in the Charter of 18th May, 1920. Till 1918 Denmark exercised the whole power in common affairs, but by the Act of Union of 1st Dec., 1918, Iceland became a sovereign state, united with Denmark only through the identity of the sovereign. There is an *Althing*, or Parliament, which meets at Reykjavik, the capital, and consists of forty-two members, of whom thirty-six are chosen by popular suffrage for four years, and six elected by proportional representation for the whole country, their term of office being eight years. The Althing is divided into two Houses, the Upper House and the Lower House. The executive power is exercised under the King by a Ministry divided into three departments. Reykjavik has 28,847 inhabitants.

History. Some settlements of Irish monks had been made in Iceland about the end of the eighth century, but the island received the greatest proportion of its population from Norway. In 870 Harald Haarfager had made himself supreme in Norway, and as he treated the landed proprietors oppressively, numbers left the country and went to Iceland. In the course of sixty years all the habitable parts of the coasts were settled. A settled government was established, a sort of aristocratic republic, which lasted for several centuries.

Christianity was introduced in 981, and adopted by law in 1000; and schools and two bishoprics, those of Holar and Skalholt, were established. The Latin language and the literature and learning of the West, introduced by Christianity, were all the more warmly received because poetry and history had already been cultivated here more than elsewhere in the Germanic north. Previously to this time the Icelanders had discovered Greenland (983) and part of America (about 1000), and they were now led to make voyages and travels to Europe and the East.

Politically and ecclesiastically the most flourishing period of Iceland—the period, too, when its intercourse with the world abroad was most active—was from the middle of the twelfth to the beginning of the thirteenth century. In 1264 Magnus VI of Norway united Iceland with his own kingdom, with which it passed to Denmark in 1380, remaining with the latter in 1814, when Norway was joined to Sweden. In 1918 Iceland once more became a sovereign state, but united as a constitutional monarchy to Denmark with one king. The parliament is called the Althing and is divided into two houses.

Language and Literature. The Icelandic language is the oldest of the Scandinavian group of tongues, and as it is believed to exhibit the Norse language nearly as it was spoken at

the date of the colonization of Iceland, it is sometimes called *Old Norse*. It is rich in roots and grammatical forms, and soft and sonorous to the ear.

Icelandic literature may be divided into an ancient period, extending to the fall of the republic, and a modern, extending from that date to the present time, the former being far the richer and more original. Poetry was early cultivated, and among the most important works in Icelandic literature is the collection of ancient heathen songs called the *Elder* or *Poetic Edda* (q v.). Histories and romantic works, known by the name of *Sagas*, are numerous. Many of these are masterpieces of prose style, and are still read with delight by the people of Iceland.

The early portion of the second period was barren of anything worth mention in the way of literature, nor can the modern period boast at all of works possessing the interest of those belonging to the ancient, though since the middle of the eighteenth century there is scarcely a department of literature in which Icelandic writers have not done something. Among modern Icelandic authors, poets, and dramatists we may mention: Bjarni Thorarensen, Jonas Hallgrimson, Gestur Palsson, Thorstein Erlingsson, Hannes Hafstein, Matthias Jochumsson, G. Gunnarson, E. Kvaran, E. Benediktsson, S. G. Stephansson, D. Stefansson, I. Einarsson and others. —BIBLIOGRAPHY: S. Baring-Gould, *Iceland: Its Scenes and Sagas*; D. Leith, *Iceland*; J. Stefansson, *Denmark and Sweden, with Iceland and Finland* (in Story of the Nations Series); Th. Thoroddsen, *Physical Geography of Iceland*; W. A. Craigie, *The Icelandic Sagas*; French, *Heroes of Iceland*.

ICELAND-MOSS (*Cetraria islandica*), a species of lichen found in the Arctic regions, and on the upper parts of lofty mountains, as, for instance, in Scotland. It is used in medicine as a mucilaginous bitter, and in Iceland is collected as a nutritious article of diet. When boiled with milk or water, it forms a jelly. Its bitterness may be removed by steeping.

ICE-MAKING AND REFRIGERATION. It is now no longer necessary for the safe conduct of a business dealing with perishable commodities to be dependent on the uncertainty of the climate, as, with artificial refrigeration, pure, dry, and cold atmosphere can be regulated to any desired temperature. The means of preserving these perishable commodities vary in size from the well-known small ice-chest to large cold storages capable of holding thousands of tons. These cold storages are divided into chambers or rooms, the walls, ceiling, and floors having to be carefully insulated to keep the heat of the atmosphere from reaching the cold interior of the chamber. The insulation varies from 3 inches to 7 inches thick, and is comprised of either charcoal, loose cork, slag-wool, or compressed cork, the last being the most up-to-date.

The working substance generally employed on land installations of refrigerating plant is anhydrous ammonia (NH_3), i.e. ammonia free from water. Ammonia is a gas under ordinary conditions, but is easily condensed to a liquid by pressure and cooling. The ammonia, in the form of a hot gas, is compressed to 150–175 lb. per square inch by means of a pump (called the compressor), and discharged into a series of coils (the condenser), which are kept cool by external spraying with cold water, causing the gas to be condensed into a liquid, which flows into a storage tank. The liquid ammonia is then expanded through a valve, which reduces its pressure and produces intense cold. During this process the ammonia evaporates, i.e. becomes gaseous, is drawn into the compressor again, and continues to go through the same cycle as long as the compressor is working.

Methods. There are three methods by which the chambers are cooled, viz. (1) *direct expansion*, (2) *brine circulation*, (3) *air circulation*.

(1) In the *direct expansion* method the liquid ammonia is expanded in coils of pipes, placed on the roof or sides of the insulated chambers; the heat of the chamber and its contents is thus absorbed directly by the expanded ammonia in the coils, and the temperature within the chamber is reduced.

(2) In the *brine circulation* method the ammonia is expanded in coils, which are surrounded by liquid brine (a mixture of water and common salt or chloride of calcium, having a very low freezing-point) reduced in temperature, and pumped through coils in the insulated chambers. The cold brine, having absorbed the heat, returns to the ammonia coils to be recooled.

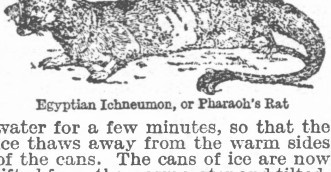
(3) In the *air circulation* process the ammonia is again expanded into coils; air is drawn over these coils by powerful fans, cooled by contact with the cold coils, and discharged through trunks into the insulated chambers, returning again to be recooled.

Refrigerated ships carrying perishable cargoes are generally fitted with the brine or air circulation, the medium used being carbonic dioxide (CO_2) instead of ammonia. Fruit and vegetables are chilled, not frozen, being kept at a temperature of 33° to 45° F. Decay in fruit is prevented, and the

action of bacteria is retarded. Meat and poultry to be chilled are kept at or about 30° F. and will keep up to forty days at this temperature. Mutton, beef, fish, poultry, &c., are kept at 5° to 18° F., and can be preserved in good condition up to three or four years. Careful handling and a steady temperature are of the utmost importance for preserving produce in good condition.

Ice Manufacture. All refrigerating machines can also be adapted for ice-making. The methods generally adopted are the *can* and the *cell* system, the former being the more convenient and popular.

In the *can* system a large tank is provided for liquid brine, which is reduced in temperature, as explained under *brine circulation*. In this liquid brine are placed sheet-iron cans filled with water. The intense cold of the brine round these cans of water causes the water to freeze until it is solid ice. The cans of ice are now lifted out of the brine and placed in a tank of warm



Egyptian Ichneumon, or Pharaoh's Rat

water for a few minutes, so that the ice thaws away from the warm sides of the cans. The cans of ice are now lifted from the warm water and tilted, when the ice slides out in a solid block.

The *cell* system consists of a large wooden tank partitioned off into compartments by hollow iron walls, which are called the cells, the water to be frozen being contained between these cells. Cold liquid brine is circulated through the cells, thus causing the water between them to be frozen. When the ice is solid, hot brine is pumped into the cells, causing the ice to thaw off the sides, when it is lifted out in solid blocks.

The brine in both systems is generally reduced to a temperature of 12° to 15° F. Whilst the water is being frozen it must be kept in motion, otherwise the ice would be like frozen snow, white and opaque. A favourite method of keeping the water in a state of agitation during freezing is by blowing compressed air at 5 to 10 lb. pressure into it, all the air and foreign matter held in suspension being thus separated from the water, so that the ice obtained is transparent and beautifully clean. The ice is made in convenient shapes from ¼-cwt. to 5-cwt. blocks, and is from 6 inches to 12 inches thick, the latter taking from forty-eight to sixty hours to make.

Previous to 1914 considerable quantities of natural ice were imported from Norway into this country, but now that the manufacture of artificial ice, which is much superior to natural ice, has reached a state of perfection, importation has ceased.

Household Refrigerators. Refrigerating plants for the preservation of perishable foods and for ice-making are used in many households, especially in the U.S.A. By means of these, meat, poultry, eggs, butter, fish and many other food-stuffs are kept in cold storage until required. These refrigerators are especially useful in hot weather, and are replacing the ice-boxes formerly used in many houses.

ICE'NI, a warlike tribe of ancient Britain, occupying the modern counties of Suffolk, Norfolk, Cambridge, and Huntingdon. They fought against the Romans under their queen Boadicea (A.D. 61).

ICE-PLANT (*Mesembryanthèmum crystallìnum*), a plant (ord. Ficoideæ) which has received the above name from the transparent vesicles (water-storing cells) which cover its whole surface, and have the appearance of granules of ice. It is a native of South Africa and the Canaries, and is also found in Greece.

ICHANG, or ECHANG, one of the treaty ports of China, province of Hupeh, on the Yangtze, about 1,000 miles up, the river being navigable all the way, but presenting difficulties above the city. There is a considerable traffic in European goods. A railway from Ichang to Kweichow is being constructed. Pop. (1931), 107,940.

ICHNEU'MON (Herpestes), a genus of digitigrade carnivorous mammals belonging to the civet family. They have a long slender body, a sharp and pointed muzzle, and short legs.

The most celebrated species, *Herpestes ichneumon*, inhabits Egypt, where it is called *Pharaoh's rat*. It was worshipped by the ancient Egyptians on account of its antipathy to crocodiles, whose eggs it digs out of the sand and sucks. It is expert in seizing serpents by the neck so as to avoid any injury to itself. It is domesticated in Egypt, and more useful, than a cat in destroying rats and mice. Its disadvantage as a domestic animal is its predilection for poultry. The mongoose, or Indian ichneumon, is another species, not so large as the Egyptian which it resembles in habits, being kept in many families as a useful domestic animal. The suricate or

meer-cat of South Africa (*Suricata tatradactyla*), closely related to the ichneumons, is more robust in build and largely vegetarian.

ICHNEUMON-FLIES, a large family of hymenopterous insects, which all agree in one particular, that they deposit their eggs either in or on the bodies, eggs, or larvæ of other insects. These apparently insignificant creatures confer inestimable benefits on man, as they destroy hosts of insects injurious to crops.

ICHTHYOL'OGY, the study of fishes, which constitute the lowest class of vertebrates in which jaws are present. It is sometimes, however, extended to include the lampreys and hags (q.v.), as the ord. Marsipobranchii (pouched gills), but these are now usually placed lower in the scale and grouped in a special class, Cyclostomata (round mouths). They are scaleless eel-shaped forms, differing from true fishes in the absence of jaws and paired fins.

Pisces, or fishes proper, are jaw-bearing vertebrates adapted in various ways for life in water. Swimming is usually effected by lateral movement of a well-developed tail, and balance is maintained by fins, thin expansions of the body supported by jointed rods (fin-rays), and either unpaired or paired. The former are in the median vertical plane, and comprise dorsals, caudal (round the tail) and anal. The *caudal fin* is usually either asymmetrical in structure and external form (heterocercal) or symmetrical externally (homocercal). The paired fins are pectoral and pelvic, corresponding to the fore and hind-limbs of land vertebrates. The former are important for steering purposes. The skin is more or less slimy, and usually provided with scales, which vary greatly in character, and may be tooth-like (dermal denticles), or strong bony plates, or thin, flexible, and overlapping. A peculiar streak, the *lateral line*, is generally present on each side of the body, and this is associated with special sense-organs related to an aquatic life. The breathing organs are *gills*, delicate vascular out-growths from the walls of gill-clefts by which the pharynx communicates with the exterior. In all but lung-fishes the heart possesses but one auricle, and contains only impure blood, which is pumped through the gills, where it is oxygenated, and then to the general body. In many fishes there is a swim-bladder, the primary use of which is to act as a float, but in some cases it helps in breathing. Fishes are predominatingly oviparous, and in most cases the eggs are fertilized externally.

Classification. Fishes are classified as follows: Order I—Elasmobranchii. Scales as spiny plates resembling teeth in structure. Tail usually heterocercal, and mouth on under side of head. Gill-slits open directly to exterior, and not protected by a gill-cover. No swim-bladder. A few are viviparous, but most are oviparous, laying eggs contained in horny cases. Fertilization internal. (1) Selachii. Sharks and dog-fishes. Examples: Spotted dog-fishes (Scyllium); tiger- or zebra-shark (*Stegosloma tigrinum*) of Indian Ocean, marked with dark bands on yellow ground; blue shark (*Carcharias glaucus*) of Atlantic and Pacific, and attaining a length of 25 feet—an allied species (*C. nicaraguensis*) lives in Lake Nicaragua; topes (Galeus); hounds (Mustelus); hammer-head sharks (Sphyrna); porbeagles (Lamna); thresher shark (*Alopecias vulpes*); basking-sharks (Cetorhinus), northern forms that attain the length of 40 feet; Rhinodon, with minute teeth, a harmless shark that may exceed 59 feet in length; piked dog-fish (Acanthias); Greenland shark (*Læmargus borealis*); angel-shark or monk-fish (*Rhina squatina*). (2) Batoidei, with body more or less flattened from above downwards. Examples: Saw-fish (*Pristis antiquorum*); rays or skates (Raia); electric-ray (Torpedo); sting-ray (Trygon); eagle-rays (Myliobatis, &c.).

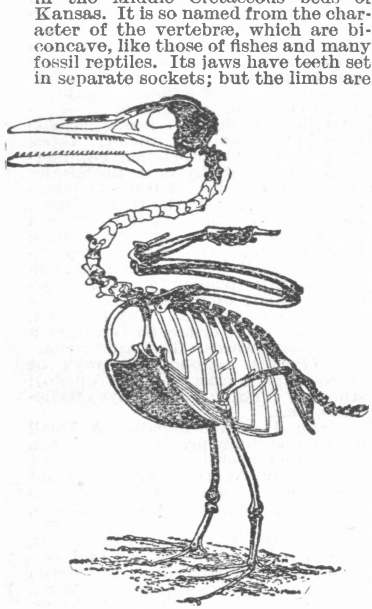
Order II—Holocephali. A small group resembling preceding, except in the characters of the skeleton. Almost scaleless, but a strong spine in front of the first dorsal fin. A membranous gill-cover. Chimæra, Callorhynchus, Harriotta.

Order III—Teleostomi. Bony fishes, usually with swim-bladder and terminal mouth. Gill-cover, supported by bones. (1) Crossopterygii. Paired fins covered with scales at their bases. Include the two freshwater African forms, bichir (Polypterus) and reed-fish (Calamoichthys). (2) Actinopterygii. Paired fins not scaly at the base. (*a*) Ganoidei. Mostly inhabit fresh water. Tail heterocercal. Sturgeons, with ventral mouth, large bony plates in skin (Acipenser and Scaphirhynchus) or largely scaleless (Polyodon and Psephurus). Bow-fin (Amia), with terminal mouth, and thin overlapping scales. Bony pikes (Lepidosteus), with armour of rhomboidal bony plates covered with enamel, and much elongated jaws. (*b*) Teleostei. Tail homocercal. Includes the great bulk of bony fishes, such as salmon, cod, and sole. (*See* TELEOSTEI).

Order IV—Dipnoi. Freshwater bony forms in which the swim-bladder is used for breathing air. African lung-fish (Protopterus), South American lung-fish (Lepidosiren), Austra-

lian lung-fish (Neoceratodus).—BIBLIOGRAPHY: *Cambridge Natural History*; Sir E. Ray Lankester, *Treatise on Zoology*; Gunther, *Study of Fishes*; Dean, *Fishes, Living and Fossil.*

ICHTHYOR'NIS (Gr. *ichthys*, a fish, *ornis*, a bird), a fossil genus of carnivorous and probably aquatic birds, one of the earliest known birds, found in the Middle Cretaceous beds of Kansas. It is so named from the character of the vertebræ, which are biconcave, like those of fishes and many fossil reptiles. Its jaws have teeth set in separate sockets; but the limbs are



Ichthyornis (*after Marsh*)

bird-like and the wings are well developed. Its size was that of a pigeon.

ICHTHYOSAU'RUS (Gr. *ichthys*, a fish, *sauros*, a lizard), an immense fossil marine saurian or reptile, having an organization combining the characters of saurian reptiles and of fishes. The external form, with a dorsal fin and caudal lobes, is now known from impressions in the Jurassic beds of Württemberg. The members of this genus had four broad feet or paddles enclosed in a single sheath of integument, and a long and powerful tail, the vertebral column being continued into the lower lobe. Some of the largest of these reptiles must have exceeded 30 feet in length. Their remains range from the Trias of Southern Germany to the Upper Cretaceous, and the great British repository hitherto known has been the Lias at Lyme Regis.

ICHTHYO'SIS (Gr. *ichthys*, a fish) is a disease of the skin characterized by an overgrowth of the horny layer of the epidermis. The skin thus becomes thickened, and is rough, dry, and scaly. Some parts of the skin are more affected than other regions, but the whole skin shows dryness and scaliness. The disease appears during the first year, and increases in severity from the fifth to the fifteenth, when it becomes stationary, persisting throughout life. The ichthyotic skin is very vulnerable; chapping takes place easily, and outbreaks of eczema are common. Treatment is purely palliative. No drugs have any definite influence, but local treatment is important in the form of alkaline baths to remove the scales, and the application of glycerine or oily substances to keep down the scaliness and to lessen the roughness.

ICON'OCLASTS (Gr. *eikonoklastai*, image-breakers), the party in the early Christian Church that would not tolerate images, much less the adoration of them. At first images of martyrs and bishops were placed in the churches merely to keep their memory fresh, but in the sixth century they began to be worshipped, lights being burned before them and incense offered in their honour. The Eastern emperor, Leo III, issued an edict in A.D. 726 ordering the people to abstain from the worship of such images, and soon after he decreed their destruction. This caused great commotion, and there arose two parties in the Church, the image-worshippers and the *Iconoclasts* or image-breakers, who each in turn persecuted the other.

In 754 a council at Constantinople condemned image-worship; in 787 the second Council of Nice (Nicæa) asserted and defined the doctrine. The controversy lasted over a century, coming to an end when, under the Empress Theodora, a council held at Constantinople (842) declared in favour of the worship of images among the Greeks, a decision which was confirmed by a second council, held 869–870, in the same place. In the Western Empire also images were at first retained only to preserve the memory of pious men, but the decision of the Pope, which allowed the worship of images, finally prevailed in the Western Church. *See* ICONOLATRY.—BIBLIOGRAPHY: J. B. Bury, *A History of the Later Roman Empire*; L. Bréhier, *La Querelle des Images.*

ICONOL'ATRY, the worship or adoration of the images of sacred personages connected with the Chris-

tian religion, as images intended to represent angels, the Virgin Mary, saints, martyrs, &c. Iconolatry must not be confounded with idolatry, which worships objects as being themselves divine or possessing supernatural power. The worship or adoration of images was not common in the Church for several centuries after Christ, and in its earlier stages it excited strong feelings, especially in the Eastern section of the Church. (*See* ICONOCLASTS.) The second Council of Nicæa taught that images were to be retained, but that they were not to be objects of adoration in the strict sense, though it was right to salute, honour, and venerate them, and to burn lights and incense before them. This decree was rejected by Charlemagne and by a council at Frankfurt in 794, but the practice of image-worship finally established itself in the West.

Roman Catholics maintain that the cultus of images is 'relative,' and that they are not in themselves really adored or honoured, 'but that all adoration and veneration is referred to the prototypes, inasmuch as images have no dignity or excellence to which such honour properly appertains.'

ICTERIDÆ, a family of American passerine birds, allied to the finches, remarkable for the hammock-like nests which they construct, and hence called *hangnests*. The Baltimore bird (*Icterus baltimorii*) may be regarded as typical.

IDA, in ancient geography: (1) A mountain range in the Troad (Mysia), at the foot of which lay the city of Troy. Its highest peak was Gargarus, about 4,650 feet. (2) The middle and highest summit of the mountain chain which divides the Island of Crete from east to west. This peak affords a fine prospect, and is covered with woods of pine, maple, and cedar.

IDAHO, one of the United States of America, in the Mountain Division, and situated on the western slope of the Rocky Mountains, having Montana and Wyoming on the east, and Washington and Oregon on the west; and area, 83,888 sq. miles. Pop. (1930), 445,032.

Idaho owes its rise and importance to its rich gold-fields, previous to the discovery of which, in 1860, and subsequently, it was inhabited only by Indians. The surface is largely mountainous, the highest summits rising to 12,000 and 13,000 feet. In the centre of the state are the Salmon River Mountains, to which belongs the picturesque and lofty Saw-tooth Range. The chief rivers are the Lewis or Snake River and the Salmon River, the latter a tributary of the former, which again joins the Columbia. Along the course of the Snake River in the south-east and south is a desert tract 400 miles long by 40 to 60 miles broad. There are valuable forests, but they extend only over a small area. The scenery along the Salmon River in some places is grand, the stream flowing between perpendicular walls of rock from 500 to 2,000 feet high.

Gold has been found in many places and there are also valuable silver-mines, gold and silver being produced in 1931, to the value of 373,300 dollars and 2,150,653 dollars respectively. Coal, copper, iron, and salt are likewise found in many localities. The wild animals include the grizzly bear. The higher mountain ranges are bleak and barren, but the lower hills are generally well wooded, and the soil of the valleys is productive. In general the surface is better adapted for grazing than for cereal raising. In 1932 there were 2,951 miles of steam, and 121 miles of electric railways. The Cèlilo Canal connects Idaho with the Pacific. Boisé City is the capital; pop. (1930), 21,544.

The State legislature consists of two houses, a Senate (44 members) and a House of Representatives (70 members). Two senators and two representatives are sent to Congress.

ID'DESLEIGH, Stafford Henry Northcote, first Earl of, English statesman, born 1818, died 1887. He was educated at Eton and Balliol College, Oxford, where he gained high honours; became private secretary to Gladstone in 1842, and was called to the Bar in 1847. In 1851 he succeeded his grandfather in the family baronetcy. He held various offices, and represented several constituencies as a Conservative, being long member for North Devon. He published a treatise, *Twenty Years of Financial Policy,* in 1862. He was one of the Commissioners to the United States in 1871 to arrange the *Alabama* difficulty.

After being Secretary for India (1867–8) and Chancellor of the Exchequer (1874–80) under Disraeli, upon the elevation of the latter to the peerage he became leader of the Lower House, his task being all the more difficult owing to parliamentary obstruction. He was elected Lord Rector of Edinburgh University in 1883. In 1885, when Gladstone was succeeded by Lord Salisbury, he was created Earl of Iddesleigh, and became First Lord of the Treasury, being Foreign Secretary in the next Salisbury Cabinet.

IDE, a fish of the carp family (Cyprinidæ), the *Leuciscus idus,* found in rocky lakes of Central and Northern Europe. It is a good table-fish,

which might be introduced into British waters. A gold-coloured German variety is known as the orfe.

IDEA (Gr. *idea*, from *idein*, to see; Lat. *idea*, kind, form). The philosophical term idea was introduced by Plato, who designated by it the perfect and eternal models, the prototypes, essence, and archetypes of individual, sensible objects, which are only the images of the ideas. According to Plato, ideas constitute the essence and the types of sensible objects, and have their existence not only in our minds, as abstracts of concrete things, but separately and independently outside our minds. Ideas are perfect and immutable, not being subject to that change which individual objects usually undergo.

In modern philosophy the term idea has a different meaning. It designates the image and conception which the human mind forms of an object. An idea is thus the *conception* of the object, as distinguished from the object itself. According to Descartes, idea means "all that is in our minds when we conceive a thing," whilst Locke applied the term idea not only to a concept of the intellect, or an image of the imagination, but also to "that which the mind is employed about, when thinking."

As to the origin of ideas, some philosophers are of opinion that they are derived solely from experience, whilst others maintain that reflection upon experience (i.e. the help of reason) is also necessary to supplement our knowledge. According to Leibnitz, all ideas are *innate*. *See* IDEALISM.

IDE'ALISM, in philosophy, is the theory which teaches that all material objects are only ideas in some mind, and that the subjective or ideal existence is not only the original but the only true being. According to this theory only a phenomenal existence is allowed to sensible objects, an existence which is dependent upon the mind of a thinking subject.

Idealism may be considered metaphysically and epistemologically. Metaphysically idealism teaches that not inanimate matter but intellectual principles are the really existent, that the world throughout is the work of the embodiment of reason or mind. The diametrical opposite of this idealism is materialism, which maintains that 'the universe is simply a brute fact, or a collection of brute facts under the sway of mechanical laws.' The oldest system of idealism is that of Plato. He maintained that ideas have a real existence, and are the prototypes of all phenomena. All true being he placed in the divine ideas, of which sensible objects are only copies in the element of the non-existent, and accordingly have in themselves merely a phenomenal or apparent existence. In modern philosophy metaphysical idealism has been developed in the systems of Fichte, Schelling, and Hegel.

Epistemological idealism, which belongs entirely to modern philosophy, is the theory which, in contradistinction to *realism*, teaches that 'perceptions of things' and, things in themselves', that 'thought' and 'existence,' or 'reality,' are widely different. Realism teaches that things are exactly so in reality as they appear to us through the medium of our perceptive faculties. The world 'without' is as real as, and exists independently of, our consciousness which perceives it. In contradistinction to this doctrine, idealism maintains that knowledge is not at all the perception of things as they really are—the exact copy and repetition of things in themselves—but as they appear to us. Knowledge being an inner psychical process, there can be no similarity between it and the things 'without.' The world around us is only the product of our mind.

Whilst the realist considers that in sense-perception we have a certainty and a guarantee of the reality of existence, the idealist is of opinion that 'the only reality of the external world is its perceptibility.' Descartes, Malebranche, Leibnitz, Spinoza, and Kant are idealists to a certain extent. Descartes and Kant, however, are not pure idealists, inasmuch as they allow at least a problematical existence to sensible things as independent of the thinking subject.

The real founder, however, of modern idealism was Berkeley (q.v.) who maintained that what is called matter consisted merely of what he called ideas, that is, appearances produced in the mind by the direct influence of the Deity. This dogmatic idealism of Berkeley differs from the critical or transcendental idealism of Kant, who taught that all the material of experience is given in sensation but, on the other hand, the forms of the experience (space, time, and the categories of the understanding) arise in ourselves a priori, and that accordingly sensible objects are known only as they appear to us and not as they are in themselves.

Idealism in æsthetics is the opposite of naturalism or realism. Naturalistic in art is the theory which maintains that the aim and purport of art consists in the imitation of nature, or, at least, in the endeavour of the artist to approach as nearly as possible to nature. In contradistinction to this theory, idealism teaches that if the

artist copies, he also modifies nature at the same time. He selects and recombines, thus bringing out immanent meanings and interpretations. He conceives an ideal and produces it, blending reality with his own thoughts and sentiments. *See* PHILOSOPHY.

IDEN'TITY (Lat. *idem*, the same) is a philosophical term applied to the sense, which every one of us possesses, of being the same individual to-day as yesterday and the preceding days, i.e. of continuing our personality. We discover in ourselves, in our personality, an indefinable something, an ego, or an I, which remains the same under various and varying circumstances. Thus personal identity is the continuity of personal existence, our being the same persons from the beginning to the end of life. It is upon this feeling that Descartes and other philosophers based their dualistic theory of body and soul, and of the spiritual nature of the latter. The body undergoes continual changes, but the soul remains the same.

Under the principle of identity (in logic) we understand the condition of remaining constantly the same. As long as it has not been subjected to modification a thing remains the same; it *is what it is*. This principle is expressed in the formula of A = A, or the same is the same. Derived from and connected with this principle are the principles of contradiction: (1) that a thing cannot at the same time be itself and something else; (2) that it must be one thing, or another; and (3) that between a thing and its opposite there can be no middle term. The philosophy of Schelling was called by himself the Philosophy of Identity, as teaching the identity of thought and being.

IDENTITY of person in point of law must often be proved in legal proceedings, as in proving a thief, &c. The usual proof is the oath of one who was cognizant of the facts at the time referred to. A common defence of persons accused of crime is that it is a case of mistaken identity, in which case the prisoner must usually prove an *alibi*—i.e. that he was in some other place at the time specified. *See* BECK CASE.

IDIOCY is the term applied to a condition of defective development of intelligence usually associated with an arrest of the development of the brain. Thus anything that interferes with the normal growth of the brain, such as premature closure of the sutures of the skull, injuries to the brain itself, or disease affecting it either before birth or before the intellectual powers have been acquired after birth, may cause idiocy. Chronic alcoholism or syphilis in the parents may so affect the germ plasm or the tissues of the growing embryo that the development of the brain becomes impaired. Other diseases in the mother, as well as exhaustion from too frequent child-bearing, or other factors of a mechanical or chemical nature that interfere with the proper nutrition of the developing child, may impair the growth of the brain so as to produce mental deficiency.

Any influence after birth that impairs the normal unfolding of the child's mind may result in idiocy. Injuries to the brain, hæmorrhage, inflammation, the interference with the drainage of the cerebro-spinal fluid, causing hydrocephalus, are among the causes that often lead to a destruction of cerebral tissue and an impairment of the budding intelligence. Epilepsy and tubercular meningitis are prone to result in mental impairment. If early in life a peculiar gland in the neck, known as the thyroid, is injured or destroyed by disease, a special form of idiocy known as cretinism results.

Every gradation of idiocy may occur, from a total absence of any sort of intellectual control of the animal functions to such slight impairments as derective memory and inability to concentrate the mind or fully to exercise self-control. Idiocy is often associated with deformities of the body due to defective growth, and some of the signs of a lack of intellectual control are dirty habits and indecent behaviour. Nothing can be done in extreme cases (where there is no obvious cause that can be removed) other than the most assiduous and sympathetic supervision and care. But the less severely affected patients can be taught (in special schools with patient and devoted teachers) habits of cleanliness and obedience, and also in some cases useful work of a simple mechanical kind.

The lack of self-control makes idiots, both boys and girls, a special danger to the community, from their aptitude to give free rein to their sexual instincts. The danger lies not merely in their own vicious practices, but also in the fact that they may produce new generations of potential criminals and evil-livers. Thus even when idiots are not really a danger to themselves or an offence to those with whom they live, confinement in a proper institution is in most cases desirable to prevent them from indulging their sexual passions and procreating dangerous members of society.—BIBLIOGRAPHY: N. H. Goddard, *Feeble-mindedness*; C. P. Lapage, *Feeble-mindedness in Children of School Age*; E. B. Sherlock, *The Feeble-minded*;

T. Ribot, *The Psychology of Attention*; Sollier, *Psychologie de l'idiot et de l'embécile*.

IDIOSYN'CRASY, a distinctive peculiarity of the mental or bodily constitution of any person, or that constitution or temperament which is peculiar to any person. The term sometimes corresponds with *antipathy* (q.v.). In medicine it is applied to the unusual reaction of a person to food, drugs, or any kind of stimulus. Thus a dose of quinine that would produce no obvious effect on most people may cause the most profound disturbances in others. Certain kinds of healthy food may also upset some individuals.

I'DOCRASE, or **VESUVIANITE,** a mineral crystallizing in square prisms of the tetragonal system, commonly occurring as brownish aggregates. It is a basic calcium aluminium silicate, and commonly arises in limestone altered by contact with igneous masses.

IDOL'ATRY, the use of idols or images supposed to represent the deity, or rather some particular god or goddess, for purposes of worship or religious appeal in its widest sense. The interest of the study of idolatry is enhanced by the realization of the fact that it represents a phase through which all the higher religions passed in the course of their development, not excluding those which insist upon the repudiation of idols as one of the cardinal tenets of their belief.

To appreciate the significance of idols it must be remembered that the fundamental conception underlying all religions is the quest of life and the averting of death. At first the search for 'a giver of life' aimed at discovering some elixir which would rejuvenate the individual and postpone death, if it did not avert it altogether; but eventually, when it was realized that death was the inevitable fate of every living creature, the aim of religion was to secure the prolongation of existence after death and the attainment of immortality, which in the more primitive religions was the exclusive privilege of the gods and the chief distinction between gods and men.

The original life-giving amulet seems to have been the cowrie shell, because it was regarded as a model of the reproductive organs of women, whence all life was derived. Then models of the cowrie were made for use as life-giving and death-averting amulets. Then these amulets were personified and converted into what are erroneously called 'steatopygous' figurines, under the belief that the early women were modelled like those of the Hottentot race; but they are really models of cowries to which crude representations of the head, trunk, and limbs have been added as a concrete expression of the identification of the life-giving amulet with the Great Mother, who was regarded as the creator and giver of life to the whole universe.

The next phase in the development of idolatry arose from the Egyptian custom of making portrait-statues of a deceased king, queen, or noble, which (so it was believed) could be converted in the most literal sense of the term into 'a living image;' it could be reanimated and could listen to the requests of supplicants. As the original god (Osiris) was merely the dead king, who was believed to control all the processes of life-giving and prosperity-giving in his dominions, the earliest form of masculine idol was a model of the dead sovereign in stone, clay or metal, which was animated by appropriate procedures, and was then supposed to be able to hear and grant the appeals made to him by his former subjects through the intermediation of the ruling king, who *ipso facto* was the high priest.

The great boon which the earliest deity was believed to give was an adequate water-supply for agriculture, either a good inundation or beneficent rain. The idols of both the male and the female deities assumed a bewildering variety of forms, as they were identified with many animals, such as the cow or ox, the pig, the lioness or lion, the eagle or falcon, the sheep or goat, &c. But the conception underlying all idolatry was the granting of life-giving or death-averting boons. For bibliography *see* G. Elliot Smith, *The Evolution of the Dragon*, Manchester, 1919; Sir James Frazer, *The Golden Bough*, &c.

ID'RIA, a town of Italy, in the province of Udine, formerly (before the European War) in the Austrian province of Carniola, 21 miles south-west of Laibach. It is celebrated for its mines of quicksilver, which, after those of Almaden in Spain, are the richest in Europe, and employ in mining and smelting about 1,300 persons. Pop. 6,100.

IDUMEA. *See* EDOM.

IDUN, or **IDUNA,** a goddess in the Scandinavian mythology, wife of Bragi, keeper of the apples of which the gods ate to keep themselves young

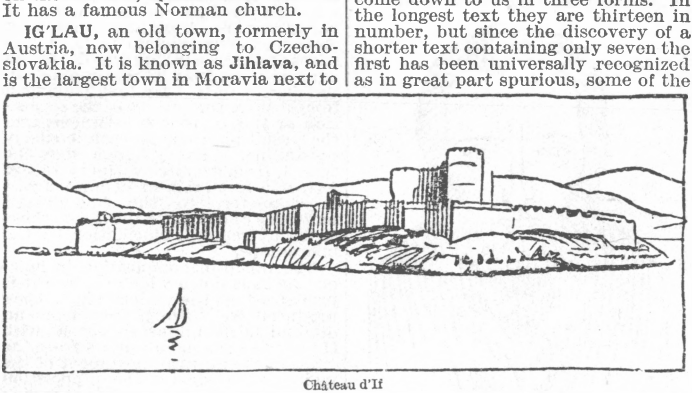
I'DYLL (from Gr. *eidyllion*, a 'little image') is the name originally and still most usually applied to a short and highly-finished descriptive poem especially if it treats of pastoral subjects, though this last circumstance is not an essential character of the idyl

All that is necessary to constitute a poem of this class is that it presents to view a complete picture in small compass. The term was originally applied to the poems of Theocritus, Bion, and Moschus, but it has been loosely used by many writers, and the idyll can hardly be said to be a definite literary form.

IF, a small island near Marseilles, on which is the Château d'If (built by Francis I about 1530), formerly a French State prison. The Château d'If figures in the masterpiece of Dumas père, *Le Comte de Monte Cristo.*

IFFLEY, village of Oxfordshire. It is on the Thames, 1½ miles from Oxford. It has a famous Norman church.

IG'LAU, an old town, formerly in Austria, now belonging to Czechoslovakia. It is known as **Jihlava,** and is the largest town in Moravia next to



Château d'If

Brno, on the Jihlava, 49 miles W.N.W. of Brno. The staple manufacture is woollen cloth. Pop. (1930), 31,031.

IGLESIAS, a walled town of Sardinia, in the provinces of Cagliari. In its vicinity are lead, zinc, and other mines. Pop. 20,000.

IGNATIEV, Nicholas Paulovitsh, Russian soldier and diplomatist, born in St. Petersburg (Leningrad) in 1832, died in 1908. He served in the Crimean War, and was made a colonel in 1856. In 1858 he was sent on a special mission to Bokhara and Khiva, and proceeded as an Ambassador to Peking in 1860. He was appointed minister at Constantinople in 1864, and was envoy extraordinary from 1867 to 1878. He was conspicuous in the negotiations before and after the Russo-Turkish War, and was appointed Minister of the Interior, but was dismissed in 1882. He represented the party in favour of war, in opposition to Prince Gortschakov. He was subsequently made Governer-General of Irkutsk.

IGNATIUS, ST., Bishop of Antioch, one of the Apostolic Fathers, said to have been a disciple of the Apostle John. His life and death are wrapped in fable. According to the most trustworthy tradition, he was appointed Bishop of Antioch A.D. 69, and was thrown to wild beasts in the circus of Antioch by the command of Trajan, the date being given by some as A.D. 107, by others as A.D. 116. By the Greek Church his festival is celebrated on 20th Dec., by the Latin on 1st Feb.

In the literature of the early Christian Church Ignatius holds an important place as the reputed author of a number of epistles. These have come down to us in three forms. In the longest text they are thirteen in number, but since the discovery of a shorter text containing only seven the first has been universally recognized as in great part spurious, some of the letters entirely so, and others containing interpolations. But even in this shorter form their genuineness has been disputed by numerous scholars. Both of these texts are in Greek, but a still shorter text in the Syriac language, containing only three letters, exists. Some maintain that the Syriac text was the earliest, though not earlier than the middle of the second century. Others hold the genuineness of the shorter Greek text.

IGNATIUS, ST., Patriarch of Constantinople, son of the Emperor Michael I, was born about A.D. 798, died in 878. When his father was deposed he entered a monastery, assuming the name of Ignatius. In 846 he was raised to the patriarchate. He was opposed to the Iconoclasts, and his refusal to admit Bardas, brother of the Empress Theodora, as a communicant, on account of his reported immorality, led to his deposition in 857. The schism between the Greek and Roman Churches began

while Photius, his successor, was in office, and has continued ever since. He was reinstated in 867, and at an œcumenical council assembled at Constantinople in 869 Photius and his party were condemned.

IGNEOUS ROCKS (Lat. *ignis*, fire), rocks that have been at some time molten in the earth's crust, and that have consolidated in subterranean cauldrons, or as dykes filling cracks up which they have been forced, or as lava-flows and exploded fragmental accumulations at the surface. They consist almost entirely of silicates, with a few oxides, such as those of iron, titanium, and chromium. The observation of igneous rocks naturally began amid the stimulating if alarm-

St. Ignatius

ing phenomena of volcanoes, and it was long before the great sheets of basalt, cut off from their parent sources by denudation, or the masses of granite that send off veins into surrounding rocks, were recognized as truly igneous.

The controversy between *Neptunists*, who adopted the view of Werner that basalts were sedimentary and that the crystals of granite had separated from aqueous solution, and the *Vulcanists*, led by Hutton, who maintained the efficacy of internal heat, raged fiercely at the close of the eighteenth century; and, if the Vulcanists were triumphant, it must be admitted that occluded water has much to do with the phenomena of molten masses in the crust. This water escapes, with various gases, from lava-flows, and its expansion and passage into steam play a large part in volcanic eruptions. The association of water and gases no doubt assists the subterranean molten masses to corrode the walls of their cauldrons and to make a place for themselves among the superincumbent rocks. Igneous rocks often occupy the core of mountain chains, where the arching of strata has allowed of their rise, assisted by the general pressure, from the depths; but they extend their domain by 'stoping' off blocks from the cover, and they work their way upwards by prolonged and insidious attack.

At the surface or in thin veins they may cool with comparative rapidity, and the crystallization of their constituents is here on a minute or partial scale. A certain amount of glass may even remain in the interstices of the crystalline mesh. But an igneous mass may be maintained in the depths for a very long time at a temperature that allows of the separation of this or that constituent, and the resulting rock is then coarsely crystalline. Every stage may be traced, from granites with crystals of felspar 5 feet long, or of mica 9 feet in diameter, to the fine-grained materials of dykes, or the lavas whose structure requires elucidation by the microscope.

The range of composition in igneous rocks is not a wide one, and it is probable that the varieties have been produced by *differentiation* from an original fairly uniform magma, with the aid of material absorbed from the crust in the upward movement of the molten masses. On the supposition that these masses come from a region of the interior where rocks of the composition of basalt prevail, minerals poor in silica, and rich in magnesium and iron, such as olivine, may separate during cooling and sink towards the floor of an igneous cauldron, leaving a magma more rich in silica, potassium, and sodium in the upper layer. This magma may become still more siliceous by assimilating matter from the outer crust as it ascends, and highly siliceous igneous rocks may ultimately reach the surface. Where volcanic vents lead down into the greater depths, or where some fissure taps the lower part of a cauldron, the magma rich in magnesium and iron flows up, and its greater fusibility and mobility may produce lava-flows that, age after age, deluge thousands of square miles of country.

Igneous rocks have formed a special study, carried out with great minuteness of classification; but the percentage of silica may be taken as the broad basis of grouping, and within each group structure may be used for

subdivision. The old terms *acid* and *basic* have been used for the groups with some 70 per cent and 45 per cent of silica respectively, and a large *intermediate* group lies between them. Granite, consisting of quartz, potassium felspar, and mica, is the type-rock of the acid group, and olivine-gabbro, consisting of felspar rich in calcium, pyroxene, olivine, and iron-titanium ores, is the type-rock of the basic group. It may be convenient to arrange the common igneous rocks as in the table following.

In reading older treatises, we must remember that in Germany, where classification by carefully defined characters has sometimes obscured natural alliances, a sharp division was at one time made, under the influence of H. Rosenbusch, between Cainozoic igneous rocks and those older than the Eocene period. This view spread in France, Italy, and even in the United States, but at no time prevailed in the British Isles, where the 'uniformitarian' principles enunciated by Hutton and Lyell caused stress to be laid on the resemblances rather than on the differences of rocks formed in successive periods.

	Granite Group.	Syenite Group.	Diorite Group.	Olivine-gabbro Group.
Coarsely crystalline	Granite	Syenite	Diorite and gabbro	Olivine-gabbro
Finely crystalline	Compact granite (quartz-felsite, &c.)	Compact syenite	Compact (aphanite and dolerite)	Olivine-dolerite
With some traces of glass	Rhyolite	Trachyte	Andesite and basalt without olivine	Olivine-basalt

It was pointed out, especially by J. W. Judd (1876 and onwards), that the more glassy types of igneous rocks could be traced in denuded volcanic areas into crystalline masses that had consolidated slowly underground. The highly crystalline rocks that are best known to us are naturally ancient, since those of later date commonly remain unexposed; but Judd showed that in Hungary and the Inner Hebrides there were granites, diorites, and gabbros of Cainozoic age. The absence of glassy lavas from the majority of ancient volcanic areas is due to the readiness with which glass becomes crystalline in the course of geological time. Since the opening of the twentieth century, the factor of age has been happily discarded from the nomenclature of igneous rocks, and it is recognized that there has been no evolution of new characters among them during the long ages covered by stratigraphical geology. *See* GEOLOGY.

IGNIS FAT'UUS (Lat., 'foolish fire'), a luminous appearance seen floating over marshy places at night, and sometimes, it is said, in churchyards. It is probably due to some gaseous mixture capable of igniting spotaneously, but it has never been satisfactorily explained. Other names are *Will-o'-the-wisp* and *Jack-a-lantern*.

IGNITION, the act of raising the temperature of a combustible substance until it unites freely with the oxygen of the atmosphere (or other gas), with the accompanying production of light and heat. Each combustible has a definite temperature at which the process of burning begins.

The knowledge of fire is world-wide, and few, if any, tribes have been found ignorant of its production and uses. The early methods of fire production made use of concussion or friction. The action of flint and steel was probably discovered in shaping stone into implements. Other concussion methods of fire production made use of pieces of quartz coated with native sulphur or iron pyrites, which were struck together. Early friction methods made use of two pieces of bamboo, broken pottery and bamboo, a stick used in rubbing a groove on a piece of wood, or a hand- or bow-drill rotated stick on a piece of wood. In every case the heat produced was used to ignite some material with a low ignition temperature. The action of the lens and concave mirror in concentrating the sun's rays to cause the ignition of inflammable materials was also known to the ancients.

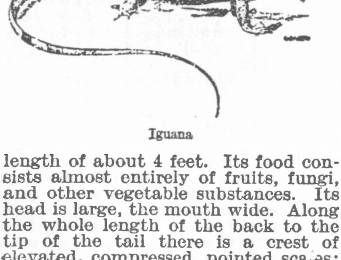
The word is also used to denote the firing of explosive mixtures in internal-combustion engines (q.v.).

IGNORANCE, in law, may be of law or fact. The former excuses no one, and is no defence in criminal proceedings; otherwise the administration of justice would be impossible. The latter may be a good defence if not due to negligence or omission of duty.

IGNORAN'TINES, a religious congregation of the Roman Catholic Church devoted to the gratuitous education of children. It was founded in 1679 at Rheims, and reorganized about 1683 by the Abbé de La Salle. The statutes of the order, approved by Benedict XIII in 1725, impose on its members vows of chastity, poverty, and obedience. In 1789 the order counted 1,000 members, and possessed 121 houses. They were forced to quit France, but were recalled by Bonaparte in 1806. They are now to be met with in various countries. In France the law of 1882 banished them from the public schools.

IGUALADA (ē-gwä-lä'dä), a town in Spain, province of Barcelona, 36 miles W.N.W. of the town of Barcelona, on the Roya, with manufactures of cottons and woollens. Pop. 10,575.

IGUAN'A, a genus of lizards, the type of the family Iguanidæ, a native of tropical America. It has an average



Iguana

length of about 4 feet. Its food consists almost entirely of fruits, fungi, and other vegetable substances. Its head is large, the mouth wide. Along the whole length of the back to the tip of the tail there is a crest of elevated, compressed, pointed scales; the lower part of the head and neck is furnished with a dew-lap or throat-pouch. The toes are furnished with sharp claws, which enable it to climb trees with ease, while a rapid serpentine movement of its tail propels it swiftly through the water. Its usual colour is dark olive-green. Its flesh is considered a delicacy, being tender and delicately-flavoured, resembling that of a chicken. The eggs, of which the female lays about two dozen, are also eaten, having an excellent flavour. They are about the size of those of a pigeon, are laid in the sand, and hatched by the heat of the sun.

IGUAN'IDÆ, a family of American lizards of which the iguana is the type. They have the body rounded, sometimes laterally compressed and furnished with a ridge or serrated crest along the middle line of the back from snout to tip of tail, sometimes a throat-pouch or dew-lap present. *See* IGUANA.

IGUAN'ODON, an extinct herbivorous colossal reptile found in the Wealden strata; so called from the resemblance of its teeth to those of the iguana. The pelvic bones were strikingly like those of birds. The integument does not seem to have possessed the spines or bony plates of allied species. The vertebræ of the back were flat at both ends, while those of the massive tail had concave surfaces. The teeth were large and broad, implanted in sockets, and transversely ridged. The just conclusions of Owen and of Mantell, the discoverer of the remains in England, were amplified by the study of a number of complete specimens of a still larger species near Mons, in Belgium, in 1878.

IL'CHESTER, a town of England, in Somersetshire, anciently an important Roman station, and furnishing numerous Roman remains. Roger Bacon was born at Ilchester. Pop. 449.

ILDEFON'SO, SAN, a village of Spain, near which is La Granja, a royal palace, built in a mountainous country by Philip V, in imitation of Versailles, 6 miles north-east of Segovia, 40 miles north by west of Madrid. The palace contains a great number of valuable paintings and statues, and the gardens are magnificent.

ÎLE-DE-FRANCE (êl-dė-frăns), a former province of France, having Paris as its capital, and now mostly comprised in the departments of Seine, Oise, and Seine-et-Oise.

ILFORD, a municipal borough of England, in Essex, forming part of the eastern suburbs of London, containing the lunatic asylum of the London County Council, and various industrial works. The place has a large and increasing working-class population. There is an interesting chapel of the hospital of St. Mary and St. Thomas, originally founded in the twelfth century. Photographic materials are manufactured. Pop. (1931), 131,046.

IL'FRACOMBE, a market town of England, Devonshire, on the Bristol Channel, 41 miles N.W. of Exeter; very picturesquely situated. There is an inner and an outer harbour, the former admitting ships of 300 tons, and an active trade in coal, cattle, and agricultural produce with Welsh and Irish ports. Ilfracombe is much resorted to as a bathing-place and health resort. Pop. (1931), 9,174.

ILI, a river of Central Asia, partly in Chinese Turkestan but mostly in Russian. It is formed in Chinese Kuldja by two streams, the Tekes

and Kunges, rising in the Tian-Shan Mountains, and flows westwards, falling into Lake Balkash by several mouths after a course of 900 miles, over half of which it is navigable.

ILIAD, THE, poem by Homer. It deals with the events that occurred during the 10th and last year of the siege of Troy, or Ilium, by the Greeks. It begins with the wrath of Achilles, who refuses to take any further part in the fighting. Led by Hector, the Trojans are successful until Achilles changes his mind and again enters the field. The Iliad is in 24 books, and there are many English translations.

ILK'ESTON, a municipal borough of Derbyshire, England, 10 miles E.N.E. of Derby, situated on a lofty hill. The church is a fine ancient building. Manufactures of hosiery and lace are carried on, and coal and ironstone are worked. Pop. (1931), 32,809.

ILKLEY, an urban district and watering place, village of Yorkshire, England, 31 miles west of York, beautifully situated on the Wharfe, and much frequented on account of the hydropathic establishments. Near Ilkley is the fine old ruin of Bolton Priory. Pop. (1931), 9,721.

ILLE-ET-VILAINE (ēl-e-vi-lān), a maritime department in the north-west of France, lying between the English Channel and the department of Loire-Inférieure. It is watered mainly by the rivers from which it derives its name—the Vilaine, and its tributary, the Ille. Little more than one-half of the surface is arable. The cereal crops consist chiefly of wheat, meslin, rye, and oats; other crops are buckwheat, hemp, tobacco, and flax. The minerals include iron, zinc, and lead. The principal manufactures are leather, sail-cloth, sacking, and coarse linens, and the coasting trade is active. Rennes is the capital; St. Malo the chief seaport. Area, 2,697 sq. miles; pop. (1931), 562,558.

ILLEGIT'IMACY (Lat. *illegitimus*, not according to law), i.e. bastardy, is, under English law, the state of a child born (*a*) out of wedlock, or (*b*) during its subsistence if it is so proved that through absence or other cause the husband is not the father, or (*c*) within such a time after its dissolution that it is physically impossible for the husband to be the father.

The obligation to maintain an illegitimate child rests on the mother, but if she can establish the paternity, the father may be ordered to contribute to its maintenance to an extent not exceeding 10*s.* per week until it attains the age of sixteen years or such earlier age as the justices may determine, or until the mother marries. The testimony of the mother as to the paternity must be supported by independent evidence in some material particular. Failure to implement her obligation so that the child becomes chargeable to the parish renders the mother liable to imprisonment, and the guardians may also proceed against the father. In Scotland the obligation is a joint and equal one, but the failure of either parent to implement it throws the whole responsibility on the other.

An illegitimate child, being in law *filius nullius* (the son of nobody), has no rights of inheritance in real or personal estate. He may, however, take a bequest under a will, and he has testamentary capacity. The only persons entitled to succeed to his estate on his intestacy are his widow and children. If, therefore, he dies unmarried and intestate, his estate vests in the Crown, the Duchy of Lancaster, or the Duke of Cornwall for the time being as 'bona vacantia,' but provision may be made thereout for the benefit of the intestate's dependents. By the Legitimacy Act, 1926, where the parents of an illegitimate person marry provided neither was married to a third person when the child was born, such person is rendered legitimate. *See* LEGITIMATION.—Cf. W. Hooper, *The Law of Illegitimacy.*

ILLI'CIUM, a genus of Eastern Asiatic and North American evergreen shrubs, belonging to the nat. ord. Magnoliaceæ. The plants of this genus are called aniseed trees, from their fine aromatic scent. The fruit of *I. anisātum* (Chinese anise) is the star-anise of the shops (*see* ANISE). *I. religiōsum* is a Japanese species, held sacred by the natives, who decorate the tombs of their dead with wreaths of it, and burn the fragrant bark as incense before their deities.

ILLIMANI (il-yi-mä'nē), one of the loftiest peaks in the *Cordillera Real* of the Bolivian Andes, 22,500 feet high, and covered with glaciers. The highest peak was scaled in 1898 by Sir Martin Conway (now Lord Conway).

IL'LINOIS (il'i-noi or -nois), one of the Western United States, bounded on the north by Wisconsin, east by Lake Michigan and Indiana, south-east by Kentucky, from which it is separated by the Ohio, and west by the Mississippi, separating it from Missouri and Iowa; greatest length, 370 miles; greatest breadth, 160 miles; area, 56,665 sq. miles, 622 sq. miles being water.

Physiography. The surface is somewhat hilly near the Ohio, and undulating towards the west; and a

range of bluffs runs for a considerable distance along the margin of the Mississippi; but with these exceptions the state is one continuous plain, with a gentle inclination towards the south-west. It has a greater proportion of arable land than any other state of the Union. The only thickly wooded part is the southernmost portion. The chief rivers are the Illinois (q.v.), which traverses the state, Rock, Kaskaskia, and Wabash.

Products, &c. Indian corn and wheat are the chief objects of cultivation, but rye, oats, buckwheat, potatoes, turnips, cotton, hemp, flax, tobacco, castor-bean, &c., are also produced, and the cultivation of the vine is making considerable progress. Illinois is one of the great dairying states, cattle and pigs being extensively raised. Lead is found in vast quantities, and the ore (argentiferous galena) contains a considerable percentage of silver; the metal is found chiefly near the Wisconsin frontier, Galena being the centre of the mining district. The state ranks third in the production of bituminous coal. Several valuable salt springs are found in the east and south. The rocks mostly are limestone, gypsum, and sandstone. The climate, although somewhat humid, is generally healthy.

Communications. The Illinois and Michigan Canal connects Lake Michigan at Chicago with the Illinois at La Salle (distance 96 miles), and enables vessels of some size to pass from the Gulf of Mexico to the St. Lawrence. In 1932 there were 12,802 miles of steam and 1,334 miles of electric railway.

Education, &c. There is a well-organized school system. Illinois University, at Urbana, is a well-equipped institution, and there are besides fifty-two other colleges and universities in the state. Springfield is the state capital, pop. 71,864, but Chicago (q.v.), on Lake Michigan, is the principal commercial depot, and after New York the largest city in the United States.

Government. Illinois was constituted a separate territory in 1809, and admitted as a state into the Union in 1818. The state legislature consists of a Senate (51 members) and a House of Representatives (153 members). It sends two senators and twenty-seven representatives to Congress. Pop. (1920), 6,485,280.

ILLINOIS, a river in the United States, formed by the union of the Kankakee and Des Plaines, in the north-east part of the state of Illinois. It flows thence south-west, and falls into the Mississippi about 20 miles above the mouth of the Missouri. It is 500 miles long, half of it being navigable. A canal connects the river with Chicago.

ILLIT'ERACY (Lat. *illiteratus*, an-educated, without letters or learning), inability to read or write. The term illiterates is applied in the United States also to people who can read but not write. The greatest number of illiterates is to be found in Russia and in the East. In Germany, Sweden, and Switzerland there is less than 1 per cent, and in Holland a little over 1 per cent of illiterates. Belgium and France have about 10 and 5 per cent of illiterates respectively. The lowest percentage of illiterates is to be found in England, Wales, Scotland, Australia, and Germany.

ILLUMINA'TI ('the enlightened'), a name given to the members of several societies, especially to those of a secret society founded in 1776 by Adam Weishaupt, professor of law at Ingolstadt, Bavaria, for mutual assistance in attaining a higher degree of morality and virtue. It spread over Roman Catholic Germany, and contained in its most flourishing condition 2,000 members, among whom were men of distinguished talents and high rank. The constitution and organization were taken partly from the Jesuits and partly from the Freemasons. Dissensions, however, were introduced into the body, and in 1784 it was dissolved by the Bavarian Government.

ILLUMINATION is the process of ornamenting a written or printed text with colours and precious metals, but is often extended to include the decoration and illustration of manuscripts by drawings, with or without colour. The colour may be either transparent or mixed with body colour, and the metal applied in liquid form, or in sheets which are afterwards burnished. The usual foundation is vellum.

The two elements of illustration and decoration in varying proportions appear in every illuminated manuscript, and their perfect balance and fusion marks all the great periods of the art. In European mediæval manuscripts the illustrative side is represented by the *miniature* (the technical term for the illustrations), and the decorative by elaborate initial letters and borders. The two combine in the *historiated initial*, where the letter encloses a miniature. The manuscripts most commonly illuminated in the Middle Ages were liturgical and devotional works, including *missals* (the mass book used by the celebrant at the altar), *breviaries* (containing the services for different hours), *psalters*, *graduals* (the choral part of the mass), *antiphoners* (the choral part of the

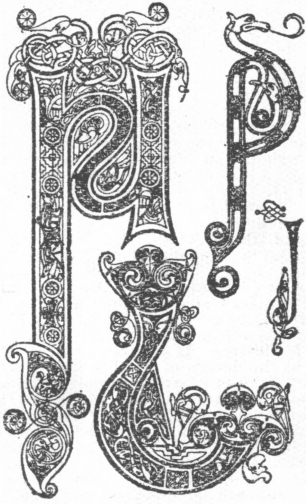
services), and *books of hours* (intended for private devotion, and containing prayers, lessons, &c.).

An elementary form of illumination appears in the coloured illustrations of Egyptian papyri; and a few classical texts of the fifth century A.D., illustrated with paintings similar in style to the Pompeian frescoes, point to the existence of an older tradition. But classic influence chiefly survives in Byzantine illumination of the ninth to the twelfth centuries, where it combines with Eastern influences to produce a hieratic, stylized art, mainly illustrative, richly treated in gold and colour.

Meanwhile, a great school of Celtic illumination developed in Ireland, marked by very conventional treatment of the figure, and an ingenious and varied use of abstract and geometrical ornament, without the use of gold. A remarkable example is the *Book of Kells*, at Trinity College, Dublin. The influence of this school passed to England, Italy, and Germany, and in the last combined with Byzantine and debased classical elements to produce the Carolingian school, which centred round the court of Charlemagne in the ninth century. At this period, also, there was a notable development of outline drawing (represented in the famous Utrecht psalter), which in England unites with the use of gold and colour from Carolingian and Celtic sources to produce the characteristically rich and delicate style of the tenth- and eleventh-century Winchester school. The same influences operate in different degrees in France, and by the thirteenth century illumination in the two countries had settled down into the lines whereon it was to develop, and may be now described as characteristically Gothic. The handling becomes minute and delicate; historiated initials are the rule; elaborate borders springing from the pendant to the initial enclose the page; and gold is applied in leaf form and burnished. A notable example is the French *Psalter of St. Louis* (Bibliothèque Nationale).

In Flanders development is similar but slower; while in Germany, after a brief period of activity connected with the tenth-century Ottonian Renaissance, illumination degenerates and never revives. In Italy a burst of activity under Celtic influence centres in the Benedictine monastery of Monte Cassino, but is followed by a period in which Byzantine influence predominates. The fourteenth century sees English illumination at its highest point, and distinguished from French by greater naturalism in its borders, and a love for the droll and grotesque (possibly imported from Flanders), both seen in the *Queen Mary Psalter* in the Royal Collection; but in the fifteenth century comes a rapid and permanent decline.

In France, where ornament is more conventionalized and the use of diapered backgrounds a special feature, the triumphs of the fourteenth century include the *Belleville Breviary* (Bibliothèque Nationale), and the work done for the library of Jean, duc de Berry (1345–1416), by André Beauneveu and Jacquemart de Hesdin. These are followed in the fifteenth century by the exquisite and magnificent *Très riches heures* (now



Initial Letters from the *Book of Kells* and other old Irish Illuminated Manuscript Volumes

at Chantilly), executed for the same patron by Pol de Limbourg and his brothers, one of the most remarkable manuscripts ever produced, which marks a culminating point. The great skill of Jean Foucquet and his followers (notably Jean Bourdichon) later in the century resulted in paintings on a small scale rather than illumination proper, and represents a decline.

In Flanders and Italy, however, the art survived longer. Flemish illumination developed *pari passu* with Flemish painting, and is marked by soft, harmonious colour and increasing naturalism, manifested in elaborate landscape background, sculpturesque figures, the use of perspective, and in

the border treatment. The *Grimani Breviary* (S. Marks, Venice) is a well-known example of the style. In Italy, under the influence of easel painting, the tendency was to produce full-page illustrations (notably to the large choir books) rather than decoration, though a characteristic border of rods and curling foliage was evolved, seen in the fourteenth-century work of Niccolo da Bologna. In the fifteenth century Renaissance influence appears in the treatment of the figures and in the decorative elements of the borders (putti, masks, and garlands), and at the end of the century a great group of manuscripts appears well represented by the Sforza *Book of Hours* (British Museum).

Printing virtually killed illumination. In the East, however, especially in India and Persia, a flourishing school existed until the early nineteenth century.—BIBLIOGRAPHY: J. A. Herbert, *Illuminated Manuscripts*; A. Michel, *Histoire de l'art* (embodying sections on the miniature); Count P. Durrieu, *Les Très riches heures de Jean, duc de Berry*, and other writings; Sir G. F. Warner (editor), *Reproductions of Illuminated MSS. in the British Museum*.

ILLUMINATION, methods of lighting have improved greatly since the days when candles were the only means of illumination. Electricity is, of course, the most popular form of lighting and is used extensively both for this and for heating purposes.

Reflectors. It has been discovered that the design of shades, globes and reflectors is of great importance and that by means of a suitable design the distribution of light may be greatly enlarged. In most cases a reflector is designed to direct the light downward, where it is most needed. In shop-windows lighting, &c., however, reflectors are so designed and spaced that they yield an illumination over an extensive vertical area.

Searchlights (q.v.), flood-lighting and artificial daylight are other systems of illumination which have advanced greatly during recent years.

ILLUSTRATION is, in the widest sense, the pictorial expression of a fact or idea previously expressed in words; and as such has been the basis of all save purely abstract art from the earliest times. More usually the term describes pictorial art associated with written or printed matter to express the same facts or ideas. Apart from the illuminated manuscripts of the Middle Ages (*see* ILLUMINATION), it first appears with the invention of printing, its use becoming possible through the development of engraving on metal and wood. Important early examples of book illustration are those by Botticelli (engraved by Landrino) to Dante's *Divina Comedia*, and by Holbein to Erasmus's *Praise of Folly*.

The style of illustration at any period mainly reflects that of contemporary painting and engraving. In fact it is not until modern times that artists almost solely concerned with illustration appear. Thus, in fifteenth- and sixteenth-century Germany illustration centres round the work of Dürer and his followers; and in seventeenth-century Italy reflects the influence of the Bolognese and Roman eclectic painters. In France, during the eighteenth century, a delicate and delightful group of engravers, such as Oudry, Gravelot, and Moreau le Jeune, based their illustrations to such works as La Fontaine's *Fables* and Molière's plays on the eighteenth-century painters from Watteau to Fragonard. In England, seventeenth-century illustration mirrors the supremacy of Dutch and Flemish painting, notably in the engraved portraits and frontispieces of Faithorne.

Hogarth, who himself illustrated Butler's *Hudibras* and other books, marks the rise of a school of realism and caricature, of whom a great master is Thomas Rowlandson, followed in the nineteenth century by George Cruikshank, well known by his illustrations to Dickens. Side by side with these is a graceful, rather exotic school founded on the work of Reynolds, and typified by Bartolozzi. Both the technique of his woodcuts and the fact that illustration was the main work of his life make Thomas Bewick a leading figure at the end of the eighteenth and the beginning of the nineteenth century. Among his contemporaries, Stothard and Flaxman represent the classicism of the age, and William Blake a mystic, individual art of great interest and importance. But the chief note of the early nineteenth century in England is the quantity of landscape illustration produced under the influence of Turner, such as his illustrations to Rogers' *Italy*.

With the rise of the illustrated periodical a new era begins. Illustration ceases to be mainly reproductive; artists whose sole work is illustration increase in number; and illustrators are encouraged to draw direct upon the wood, the material chiefly employed. An earlier phase of this movement is represented by Sir John Tenniel, Sir John Gilbert, and Birket Foster; a later and more important development by the Pre-Raphaelites, Madox Brown, Millais, and Rossetti, whose work is well represented in contemporary periodicals. A more

romantic school is typified by Frederick Sandys and A. B. Houghton; a more realistic by the important group associated with *Punch*—John Leech, George du Maurier, and Charles Keene.

The course of illustration in France and Germany was parallel. The Romantics, with Delacroix at their head, produced much work in *L' Artiste* and elsewhere; Gavarni and Daumier a matchless series of caricatures, mainly reproduced by lithography (q.v.). Other interesting figures are Gustave Doré (the illustrator of Dante and Rabelais), and the modern satirists Forain and Steinlen. In Germany the realistic work of Adolf Menzel had great influence, while at Munich a decorative symbolist group of illustrators grew up, represented by Klinger and Stück.

Modern illustration has been much affected by technical developments, all based upon photography. Engraving upon metal has practically fallen into disuse, though etching is still used for a few elaborately-produced books. Wood engraving now mainly serves to decorate finely-printed books, such as those of the Kelmscott and other presses. Notable work of this kind has been done by Charles Shannon, Ricketts, and Sturge Moore. This tendency towards decorative illustration, partly inspired by Japanese art, is also seen in the work of Aubrey Beardsley, and in the elaborate work of Arthur Rackham and Edmund Dulac.

The facility and accuracy of modern methods of reproduction of photographs, however, have rather tended to diminish the proportion of artists whose sole work is illustration. Among the more important of these methods are *line* and *half-tone* process, in which the printing surface stands at a uniform height above the surrounding ground; photogravure, in which the link lies in a series of tiny pits and grooves; and *collotype*, where the printing surface is a sheet of gelatine, prepared to absorb or give up ink in proportion to the depth of various tones in the picture. Another important modern development is *colour-printing*, now generally performed by the three-colour process (based upon half-tone process), or by collotype or off-set lithography. After the Great War there was a return to craftsmanship. The illustrations of Eric Gill and Robert Gibbings, working in wood-blocks, are outstanding features of the Golden Cockerel Press.

—BIBLIOGRAPHY: W. J. Linton, *Masters of Wood Engraving*; J. Pennel, *Pen Drawing and Draughtsmen; Modern Illustration*; T. G. Hill, *The Essentials of Illustration*; A. M. Hind, *Short History of Engraving and Etching*; E. J. Sullivan, *Art of Illustration*.

ILLYR'IA, or **ILLYR'ICUM,** a name formerly rather loosely applied to a large tract of country on the east side of the Adriatic, the ancient Illyrians being the ancestors of the modern Albanians. Piracy was carried on by the Illyrians, whose kings were therefore embroiled in quarrels with the Romans, which ended in their subjugation in 228 B.C. They sought from time to time to shake off their chains; but being always beaten, the country at last became a Roman province. The name of Illyrian Provinces was given, by a decree of Napoleon in 1809, to Carniola, Dalmatia, and other countries, then part of the French Empire. After the fall of Napoleon the Illyrian Provinces were restored to Austria, and designated as the Kingdom of Illyria, a title which the country bore till 1849, when it was divided into the provinces of Carinthia, Carniola, and the Coast-lands.

I'LMEN, a lake in Russia, government of Novgorod, near its western borders; length, about 33 miles; breadth, 28 miles. It receives numerous streams and discharges itself by the Volkhov into Lake Ladoga. It abounds in fish.

IL'MENAU, a town of Central Germany, in Thuringia, on the River Ilm. It has a grand-ducal castle, manufactures of porcelain and terra-cotta ware, and a hydropathic establishment. Pop. 13,612.

ILMINSTER, urban district and market town of Somerset. It is 5 miles from Chard and 137½ miles from London, on the G.W. Rly., and is situated on the river Isle. Bricks are made, and it is a centre of the flax trade. Pop. (1931), 2,232.

ILOILO (ē-lō-ē'lō), a seaport on the south coast of Panay, one of the Philippines, the second port of the group, exporting much sugar. Pop. (including suburbs), 49,114.

IL'ORIN, or **ILLORIN,** a town in West Africa, Northern Nigeria, about 150 miles N.E. of the Bight of Benin, a great centre of trade. Pop. 70,000, mostly Mahommedans.

IMAGE, in optics, a transient picture produced by means of light. An image of an object may be formed by reflection, by refraction, or by transmission of light through a small aperture. When light proceeding from a point A is reflected by a plane mirror, the reflected rays all seem to come from a certain point B behind the mirror.

Similarly, the mirror produces an image of an extended object, the light

which comes from the object and is reflected at the mirror seeming to come from a counterpart, or image, of the object behind the mirror. In this example the reflected light by which the image is seen does not actually pass through the image, since the light remains always on one side of the mirror. The image is therefore said to be *virtual*. When the light actually goes through the image, the image is said to be *real*; in this case it may be seen in the air, by means of scattered light, or it may be caught on a screen. *See* LIGHT; LENS; OPTICS; MICROSCOPE; TELESCOPE.

IMAGINARY QUANTITY, in mathematics, an expression involving the square root of a negative number. By the laws of algebra, the square of either a positive or a negative number

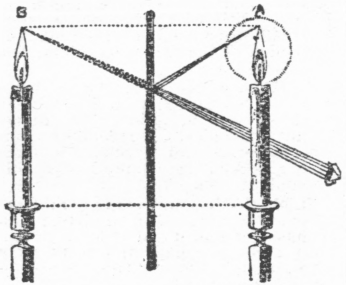


Image by reflection in a plane mirror

is positive. It follows that no positive or negative number can be the square root of a negative number. If, then, such an equation as $x^2 = -4$ comes up for solution, we are entitled to say that it has no solution, since no positive or negative number exists the square of which is -4. From this point of view, a quadratic equation may have a solution, or it may not.

There is another point of view, however, to the adoption of which the wonderful development of mathematical analysis in modern times is chiefly due. The realm of *real* number, which originally contained positive, or signless, integers only, was afterwards extended by the inclusion of fractional and negative numbers.

Similarly, we now introduce a new class of numbers, called *imaginary numbers*, and write for the solution of the equation $x^2 = -4$, $x = \pm \sqrt{-4}$. These new numbers are to be combined with one another, and with real numbers, according to the laws of algebra. Since $-4 = 4 \times -1$, we may write $2\sqrt{-1}$ instead of $\sqrt{-4}$; in fact, we may verify at once that $2\sqrt{-1} \times 2\sqrt{-1} = 2 \times 2 \times \sqrt{-1} \times \sqrt{-1} = 4 \times -1 = -4$.

The letter i is generally used for $\sqrt{-1}$; it is often called the imaginary unit. Any imaginary number can be expressed in the form $a + bi$, where a and b are real numbers. The number $a + bi$ is often called a *complex* number, the number bi being called a *pure imaginary*; so that a complex number is the sum of a real part and a pure imaginary part. Any of the operations of algebra, when performed on a complex number, lead to another complex number. The realm of number, in which the laws of ordinary algebra are fulfilled, is therefore now complete, in a sense in which the realm of real number by itself was not. *See* TRIGONOMETRY; FUNCTION; THEORY OF FUNCTIONS OF A COMPLEX VARIABLE.

IMAGINATION (Lat. *imaginari*, to picture to oneself), literally that faculty of the mind by which we can form mental *images* of things. Besides the power of preserving and recalling such conceptions, the imagination has the power to combine different conceptions, and thus create new images or mental pictures. It is this faculty which is more strictly termed imagination. In the creation of new images, or more properly in the combining of images which have previously been derived from objects of perception, the imagination operates according to the laws of the association of ideas. Its operations are nevertheless not wholly independent of the will, for by directing the attention to some leading thought, the will can determine the limits within which the laws of association are to act. Such regulated action alone can give rise to truly artistic creations.

Imagination is a complex power, to be paralleled with reasoning and with will, not with sensation or feeling. It has been rightly defined as the primitive form of reasoning, 'thinking in pictures.' But whilst reasoning works more in the abstract, with verbal images, and endeavours to determine what *is* or *must be*, imagination works with object-images, and is concerned with what *might have been*. The driving force of imagination is always emotion, and it is this emotional tone which distinguishes imagination from reasoning. *See* PSYCHOLOGY.—BIBLIOGRAPHY: T. Ribot, *Essai sur l'imagination créatrice*; William James, *Principles of Psychology*.

IMAM (i-mäm; Ar., leader or guide, from *amma*, to lead), a title

given to the Mahommedan princes of the early period, to the four successors of Mahomet, and to the twelve great leaders of the Shiites. In modern usage the name is applied to functionaries and ministers, chosen by the people and representing them, and officiating in the mosques.

In Turkey they call the people to prayer from the minarets, perform circumcision, and the rites of marriage, and burial. In ecclesiastical affairs they are independent, and are not subject to the mufti, though he is the supreme priest. They may quit their office and re-enter the lay order. The Sultan, as chief of all ecclesiastical affairs, has the title of *imam*.

IMAUS (i-mā'us), a name applied by the ancients sometimes to the Hindu Kush and the western part of the Himalayan range, and sometimes in a vague way to a range in Central Asia (supposed to be the Altaian Mountains), which they believed to divide the vast region to which they gave the name of Scythia into two parts.

IMBECIL'ITY (Lat. *imbecillus*, weak), weakness of mind which has been acquired, in contradistinction to idiocy, which is a failure in the development of intelligence. Imbeciles sometimes display a considerable amount of intelligence in certain directions, and are often very cunning. They may be interesting, amusing, and even useful members of a community.

In England there are no special legal provisions in regard to imbeciles; but this is not the case in Scotland, where it is recognized, for instance, that a person of weak mind may have sufficient understanding to execute one class of deeds without being capable of executing another class. As a general rule the court is ready to support the obligation of any contract that a person of weak mind has entered into, unless it is of such a nature that a person of sound mind would not have agreed to it, or unless there is suspicion of fraud.

An imbecile person may be summoned as a witness, but the degree of credibility attaching to his evidence naturally depends very much on the amount of intelligence he displays, and on the nature of the circumstances regarding which his evidence is offered.—Cf. H. H. Goddard, *Feeble-mindedness: its Causes and Consequences*.

IMBRO, or **IMBROS**, an island in European Turkey (restored at Lausanne in 1923), west of the entrance to the Dardanelles, 18 miles long and 8 miles broad. It is mountainous, well wooded, and intersected with richly-fertile valleys, producing wine, honey, oil, cotton, and lead. It has several villages, and the chief town is Castro. Imbro was used as a military base by the British during the European War. Pop. 9,000, mostly Greeks.

IMMERSION, in astronomy, the disappearance of a heavenly body when another passes in front of it, as in the occultation of a star or planet by the moon, or a satellite by its primary. The reappearance at the end of the occultation is called *emersion*.

IMMIGRATION, the distinction between immigration and colonization has reference mainly to the condition of the country entered. A thinly-populated country will invite immigrants as colonists; as its population grows and settled communities cover it, it will admit immigrants only under more or less stringent conditions. The importance to humanity of the opening up of new territory by colonization is obvious. Colonists have been actively recruited by the administrations of developing countries, and legislation in their favour introduced, such as the homestead laws of North America and the Russian Siberian Law (1904); or regulations framed as in Canada, Bolivia, Chile, &c., to attract suitable elements.

Free or assisted passages, premiums to agents or the immigrant colonists themselves, are devices to tempt immigrants which have been adopted by Siberia, New South Wales, Natal, and various South American states. On the other hand very stringent legislation exists against undesired immigrants. Thus Congress passed a law forbidding Chinese immigration into the United States for ten years from 1882. The law was extended for further periods in 1892, 1905, and 1917. Chinese immigration is prohibited entirely except for officials, teachers, students, merchants, and travellers for pleasure, with their families and servants. Chinese immigration into Australia was restricted by the various states before the founding of the Commonwealth, and the Commonwealth Immigration Restriction Act of 1901 admits only those Chinese, Japanese, Kanaks, and Malays who can write fifty words from dictation in a European language.

New Zealand imposes a poll tax of £100. Canada imposed in 1903 a poll tax of 500 dollars on immigrant Chinese; British Columbia has limited Chinese immigration since 1878. Japanese immigration is equally opposed in North America and in Australia and New Zealand, the Japanese being regarded as ruthless

business competitors and as much more formidable politically than the Chinese.

In South Africa, after the Boer War, many thousands of Chinese were imported for work in the Transvaal mines, but on the granting of autonomy to the Transvaal Government it at once resolved to repatriate the immigrants and to forbid the renewal of their contracts.

Much the most important field for immigration has hitherto been the United States, the 'melting-pot' of the European races. Immigration into the United States up to 1880 came mainly from Scotland, Ireland, Germany, and Scandinavia; since then the main stream has come from Italy, Austria, Poland, and Russia, these sources accounting for more than half the total in the early years of this century.

The immigration was not entirely spontaneous; it was largely due to recruiting by agents of the big shipping companies. Stringent laws barring out undesirable immigrants were passed in 1882 and 1893 (re-enacted in 1917 with a literacy test added), and the steamship companies were made liable for the repatriation of immigrants turned back. A particularly objectionable form of immigration, under contract to perform labour at rates below those secured by trade union organization, was attacked by the Labour Contract Law of 1885, which forbade immigration by labourers under contract.

The immigration into the United States averaged over 1,000,000 souls a year in the decade preceding the European War, but fell below 300,000 in 1915–6, and amounted in 1917–8 to no more than 110,618, and in 1918–9 to 141,132. A *quota* system of immigration was introduced by the United States after the European War, whereby each nationality is allowed only a definite quota of immigrants per month. In 1929 the quota was revised. In the year ending 30th June, 1930, immigrants into the U.S.A. consisted of the following: Great Britain and Irish Free State 16,415, Germany 10,401, Austria and Hungary 1,625, Italy 13,399, Russia and Finland 662, Norway, Sweden and Denmark 3,133, France 1,830.

Immigration is not an unmixed blessing even to the newer countries. The immigrants without special skill cannot be assimilated as easily as when there was virgin land within easy reach to bring into cultivation, and when machinery was in less general use. Immigrants tend, moreover, to come to rest in the large cities, and so to accentuate urban unemployment.

IMMINGHAM, a seaport of Lincolnshire, England, on the Humber, 9½ miles N.W. of Grimsby. The docks which cover 56 acres, belong to the L.N.E. Railway. Much coal is shipped. Pop. (1931), 2,150.

IMMORTALITY means the survival of the human soul or personality after death. In some more or less naive form, this belief is current among practically all primitive peoples, and comparative religion investigates the causes of such a conception, e.g. perhaps in the phenomena of dreams, where the dreamer sees the figures of those who have already died. But whatever originally suggested or shaped the belief in immortality, it has been deepened and moralized as civilization progressed.

Both philosophy and religion in modern times have set themselves to examine afresh the evidence for the belief, and to ascertain how far it is reasonable. In point of fact, it goes back ultimately to Greek philosophy and to the later Judaism; for Western nations, within the Christian tradition, these are the fundamental sources of faith in immortality. The speculations of Platonism and the religious convictions which arose in Christianity upon the soil of the later Judaism—these, rather than any influence of primitive customs or traditions, determine the modern conception of immortality.

In Platonism it was the immortality of the soul as participating, by means of its higher mental and moral activities, in the eternal and changeless ideas. To Plato belief in immortality was of supreme practical importance, but he adduces a metaphysical proof for it. The soul is the immortal part and principle in mortal human nature, a unity which rules and does not depend for its existence upon the material body.

As an idealist, Plato believes that the human consciousness is too precious to be a mere product of material conditions; he stands aloof from the current beliefs about immortality which were being already spread in the popular mystery-cults, but in his own way he inclines to trust 'the great hope' that death does not end the activity of the pure soul.

The development of faith in immortality which marked the Jewish religion is very different. It came late in the history of the religion. The naive, almost matter-of-fact, belief in the next world, which characterized Egypt, left the early Hebrews untouched. Egyptian religion was based upon faith in immortality, which took a semi-physical form. The outlook varied indeed. Heterogeneous views of the next world prevailed:

(*a*) the soul was kept in the tomb, to be revived ultimately on earth; or (*b*) it went to the western land of light and rest; or (*c*) it joined the Kingdom of Osiris. But the Egyptians viewed death as an interruption to existence, never as annihilation, and their practice of mummification went back to the basic faith that the spirit required the body to be kept as complete and comfortable as possible. The future world was a continuation of the present on higher lines, and the fortunes of the soul there depended on its conduct in the present, though no doubt to some extent on magical rites.

All this was alien to the Hebrew religion, which for centuries threw without any definite faith in immortality. Beyond death, at first, the Hebrews saw a mere shadowy, attenuated existence in the underworld; the real future life for a man lay in his family and descendants. Eventually the deepening sense of value in the individual personality led to an instinctive hope of immortality; also, the apocalyptic craving for a divine assize after death to reward the martyrs and faithful, and to condemn the wicked. The faith in immortality ratified the faith in the moral order and the individual's consciousness of the implicates of personal communion with God.

The Christian development originally proceeded along the Jewish lines, eschewing a disembodied immortality, and postulating a resurrection which involved the entire personality—the soul receiving at the final resurrection a 'body' or organism adequate to its full powers. Often this was crudely expressed, as though the dead body were to be literally raised. And at the opposite extreme, the influence of Platonism sometimes fostered an idealistic conception of immortality which simply regarded the soul as immortal. In philosophical discussion, the latter idea is connected with the assumption that the soul as such is immortal, since it either is in itself an indestructible substance or is endowed with properties of desire and growth which lead to an infinite development.

The main stress to-day, however, both in philosophical and religious circles, is upon the ethical reasonableness of the belief in immortality, viz. that the mental and moral development of the human personality here starts a process for which the term and limits of life between the cradle and the grave are insufficient, and that goodness, love, truth, and beauty in a human life carry their implicit promise of full realization after death. 'I have no doubt that the faith in immortality owes its large extension among men, in no slight degree, to the secret feeling that in the nature of man there is more contained than the measure of the present life requires and satisfies" (Martineau, *A Study of Religion* ii, p. 359).

For believers in the Christian revelation, this is guaranteed by the resurrection of Jesus from the dead, and the consequent realization of a fellowship in which the personality of the believer enters upon an eternal relationship to the divine life. The immortality here promised, however, is of the personality; the soul at the resurrection is to be invested with a 'body.' Most Christian theologians hesitate to accept theories of an innate immortality of the soul, and prefer to ground immortality on the personal experience of the believer, on the ethical and spiritual completion of his relation by faith to the living God, the supreme reality being not death but God.

Philosophical and scientific investigation may support this belief by offering evidence that, while the soul is dependent upon its present physical body, it is not so dependent as to perish necessarily with that body. Whether the further step can be taken, of proving by means of psychical research that communication between the spirits of the departed and the living involves the survival of the personality after death, is one of the debated problems of the age. Much depends, in this connection, upon the extent to which telepathy can be safely employed as a source of inferences regarding life after death.

Two particular phases of the argument regarding immortality may be mentioned in conclusion. (*a*) Corporate immortality, i.e. the immortality of the race as a whole, has been generally set aside, as inadequate. To have any satisfactory meaning, immortality must be personal. (*b*) Conditional immortality, on the other hand, has never ceased to attract a certain number of thinkers, i.e. the theory that immortality, instead of being inherent, is the reward of God for human faith, and that unworthy souls, instead of being condemned to eternal punishment, are extinguished.

—BIBLIOGRAPHY: J. Fiske, *Man's Destiny*; S. D. F. Salmond, *The Christian Doctrine of Immortality*; William James, *Human Immortality*; F. W. H. Myers, *Human Personality and its Survival of Bodily Death*; S. H. Mellone, *The Immortal Hope*; Sir J. G. Frazer, *The Belief in Immortality*.

IMMU'NITY, the power inherent in any living organism, or acquired by

it, of resisting the invasion of micro-organisms such as are liable to cause diseases. The tissues of every animal exhibit varying degrees of susceptibility to bacterial and other kinds of infection. Organisms which give rise to virulent diseases in some animals may be totally destroyed or fail to cause an infection when inoculated into other animals or even into an animal of the same species. The degree of immunity or susceptibility of any animal to a given microbe may be influenced by external and internal conditions.

The natural immunity of the healthy human body may be diminished by any circumstances that lower its vitality, its power of resistance. Thus wet and cold, starvation and malnutrition, age, loss of blood, certain poisons such as alcohol, vitiated atmosphere, and debilitating affections like diabetes and Bright's disease have a marked effect upon the natural immunity. Local injury or anything that lowers the vitality of any region of the body facilitates infection.

But immunity may be acquired, as, for example, by a previous attack of the disease, which may have been acquired naturally or by artificial inoculation. Many of the exanthemata confer this active immunity, and free the individual from the risk of acquiring the disease again. By inoculating persons with a mild form of a disease, as in vaccination against the risk of smallpox, they are protected against infection by the more virulent and dangerous form.

Within recent years a method of immunization against certain diseases (plague, typhoid fever, &c.) has been devised whereby dead cultures of the organism of the disease are injected under the skin. The subject acquires immunity in these cases by the active reaction of its own tissues against the toxic material injected into it. But an analogous result can be produced in a passive way without submitting the patient's organism to the reaction directly against the virus. Thus one animal may be immunized by the repeated injection into it of dead bacteria, and its serum is then introduced into the animal or human being to be protected against the risk of the disease in question. This method is employed in making human beings immune against tetanus, the anti-toxic serum being obtained from horses.—BIBLIOGRAPHY; J. Citron, *Immunity*; E. T. Fraser, *A Manual of Immunity*.

IMOLA, a town of Italy, in the province of Bologna, on an island in the Santerno, 25 miles west by south of Ravenna. Besides its walls flanked by towers, it possesses an old castle situated on a commanding height, a cathedral and other churches. Pop. 37,000.

IMPA'TIENS, a genus of herbs, ord. Balsaminaceæ. One species, *I. Noli-tangere*, indigenous in England, is called *noli-me-tangere*, or touch-me-not. *I. balsamina* is much grown for the beauty of its flowers, and is well known as a highly ornamental annual by the name of garden balsam. The species are numerous, and inhabit chiefly the East Indies, although some extend into Europe, Siberia, and North America. The name refers to the elasticity of the valves of the seed-pod, which discharge the seeds explosively when ripe or when touched.

IMPEACHMENT (Lat. *impedicare*, to fetter the feet), an accusation and prosecution for a crime or misdemeanour, in which the House of Commons are the prosecutors, and the House of Lords the judges. The necessity of some tribunal distinct from the ordinary courts, for the trial of certain offences, or for any high misdemeanour in certain officers, is apparent, since the judges of the highest courts cannot in all cases safely be entrusted with the trial of one another.

Impeachment is, however, seldom used, the first instance being that of Lord Latimer in 1376, and the last that of Lord Melville in 1806. One of the most famous impeachments in English history is that of Warren Hastings, which ended with his acquittal in 1795. After sentence (which is pronounced only if the Commons demand it) the Crown may pardon the offender. The question of guilty or not guilty is decided by a majority of votes.—In the United States the procedure is similar to that of England, the House of Representatives being the accusers, and the votes of two-thirds of the Senate being necessary for a conviction.

IMPEDANCE, in electricity, the ratio of the root-mean-square voltage to the root-mean-square current in a conductor or apparatus carrying alternating current. The impedance of a circuit depends on three factors viz. its *resistance*, its *inductance*, and its *capacity*, If resistance = R ohms, inductance, or co-efficient of self induction = L henrys; capacity = C farads; and if the number of cycles per second is k, then the formula for the *impedance*, in ohms, is $\sqrt{\{(2\pi kL - 1/2\pi kC)^2 + R^2\}}$ and $2\pi kL - 1/(2\pi kC)$ is called the *reactance*, which is also measured in ohms. In a circuit which includes no capacity, C is infinite, and the ter

in C disappears. In this case, impedance = $\sqrt{(4\pi^2k^2L^2 + R^2)}$, reactance = $2\pi kL$. *See* IMPEDANCE COILS; INDUCTANCE.

IMPEDANCE COILS, or **CHOKING COILS,** are electrical appliances used on alternating-current circuits to obstruct the flow of current. In ordinary direct-current work at constant pressure, the current in a circuit can be reduced by increasing the 'resistance' of the circuit. Electrical energy is converted into heat in the resistance. In alternating current, on the other hand, the obstruction which the circuit offers to the flow of current is made up not only of 'resistance' but of 'reactance,' the measure of the total obstruction being named the 'impedance' of the circuit. The required obstruction can therefore be got by means of reactance instead of by resistance, and since the reactance voltage is 90° out of phase with the current, it consumes no power. (*See* INDUCTANCE.).

A reactance coil is constructed as follows: A laminated iron core, in the form of a ring, has a coil of wire wound round it thus: The coil is continuous, and is connected in series in the circuit. The alternating magnetic field set up in the iron ring brings into play, by induction, the pressure of reactance. The apparatus is usually placed under oil in a fluted tank, the fluting being provided to give a large cooling surface.—BIBLIOGRAPHY: C. P. Steinmetz, *Alternating Currents*; C. G. Lamb, *Alternating Currents*.

IMPENETRABIL'ITY, in physics, that property of matter which prevents two bodies from occupying the same space at the same time; or that property of matter by which it excludes all other matter from the space it occupies. The fact that, when two liquids are mixed, there is often a contraction of the total volume is explained by the closer packing of the molecules of the two liquids.

IMPERA'TOR, among the ancient Romans, a term originally applied to a military commander, one who held the *imperium*, or military power. In later times no one received this title who had not defeated a hostile force of at least 10,000 men. After the overthrow of the Republic *imperator* became the highest title of the supreme ruler, and acquired the signification which we attach to the word *emperor*. It was still given, however, to triumphant generals, and in this case has its old signification. The emperors appear to have used it because they were considered as superior to all the generals. *See* EMPEROR.

IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY, educational centre at South Kensington, London. It dates from 1907, and consists of the Royal College of Science, the Royal School of Mines, and the City Guilds (Engineering) College. It has a strong staff of professors and lecturers, and its equipment is of the most modern kind. It is a school of the university of London.

IMPERIAL ECONOMIC COMMITTEE, British government committee, First appointed in 1925 in accordance with proposals at the Imperial Economic Conference, 1923, and continuing from one conference until the next, its duties are to investigate the development and marketing of empire produce suitable for the British market. The Empire Marketing Board was founded as its executive body.

IMPERIAL DEFENCE, defence of the British Empire in time of war. The necessity of framing some joint policy for the defence of the British Empire led to the association of the Dominions with the mother country in consultation and action. The matter was discussed at Imperial conferences and a committee of imperial defence was set up in London. This is concerned with the activities of the three arms, army, navy and air force throughout the whole Empire. Its offices are in Whitehall Gardens, London, S.W.1.

IMPERIAL FEDERATION, a movement, started towards the end of the nineteenth century, in favour of the federation and consolidation of the British Empire as a whole, by the bringing of its different parts into closer commercial and political relations. The object was promoted by several leagues or unions, at home and in the colonies; such as the Imperial Federation League, founded by Lord Rosebery in 1884, the Imperial Federation Defence (1893), the United Empire Trade League, the British Empire League, &c.

Joseph Chamberlain's advocacy of a change of our fiscal system was based on the desire for a closer union of the colonies and the mother country. In the twentieth century frequent meetings and conferences of the Premiers of the dominions have been held every four years except for the war years, for the purpose of furthering such a closer union. The last was in 1930. They are held in London, the Secretary for the Dominions being chairman. *See* OTTAWA CONFERENCE.

IMPERIAL INSTITUTE, an institution founded in London in 1887 (partly as a jubilee memorial), and housed in a fine building at West

Kensington, its object being to further the commercial, industrial, and other interests of the colonies, India, and the United Kingdom. Since 1899 a large portion of the building has been occupied by London University, as remodelled. The management of the Imperial Institute was transferred to the Board of Trade in 1903, and in 1916 to the Colonial Office. In 1925 an Act transferred the Institute to the control of the Secretary of the Dominions to be managed by a Board of Governors. Since 1925 the Imperial Mineral Resources Bureau has been incorporated with it.

IMPERIALISM (Lat. *imperium*, military authority, empire) is a term applied to the policy of expansion and dominion of a state or of an empire beyond the limits of self-coherent nationality.

In ancient times we find historical examples of imperialism in Assyria, Persia, Egypt, and, above all, in Rome. This policy of imperialism was again revived in the Middle Ages by Charlemagne, and in the sixteenth century by Charles V. Napoleon, who extended his dominion over non-French territories, was a striking example of imperialistic policy in more recent times.

After the overthrow of Napoleon—and especially after the Congress of Vienna—a wave of nationalism or the establishment of political union on the basis of nationality, swept over Europe, and the idea of nationality, or the independence of ethnically homogeneous elements, found currency everywhere. This nationalist movement has been witnessed throughout Europe from 1815 to the present day. It resulted in the breaking away of Greece and of the Balkan States from Ottoman rule, in the liberation of Italy, and in a national revival in Ireland, Poland, Finland, Bohemia, and Hungary.

A reaction, however, set in after the Franco-Prussian War of 1870, and once more the imperialistic movement manifested itself in European politics. Modern imperialism, however, differs from ancient imperialism, as it endeavours to reconcile national independence with imperialistic policy. It conceives not one but many civilized world-states, each ruling its dependencies and protectorates, and those nations which are considered to be incapable of governing themselves. It is the old imperialism in a new disguise, or an imperialism which is anxious not to contradict too openly the modern ideas of democracy, and particularly the favourite idea of the twentieth century—nationalism.

This modern imperialism may be termed internationalized nationalism. The result of this imperialism has been a competitive struggle between European Powers and a scramble for Asia and Africa. France, Great Britain, Belgium, Portugal, Spain, Italy, Germany, Russia, and Japan have been, and still are, engaged in this struggle. For the last thirty years it has often created discord among the Great Powers, and in more than one instance has led to wars. During this period not only the European Powers but also the United States have annexed or extended their political sway over vast areas in Asia, Africa, and the American continent.

Thus Japan annexed Korea; Italy took Tripoli and Cyrenaica; France established a protectorate over Morocco, and Great Britain over Egypt. Russia extended her sphere of influence in Persia and Manchuria, and Germany's imperialistic tendencies resulted in the European War.

In Great Britain the term imperialism was applied, in a narrower sense, to the movement which advocated a closer relationship between the mother country and the colonies, and also the expansion and spread of British influence throughout the world. The Imperialists were in favour of strong armaments and of an increasing naval power, whilst their opponents, frequently referred to as 'Little Englanders,' adhered to the doctrines of Cobden and to the principle of *laissez-faire*. They maintained that imperialism, in any shape or form, was not advocated in the interest of the nation as a whole, but only in that of certain classes. This imperialistic movement was termed Imperial Federation, and in 1884 an Imperial Federation League was established, and replaced in 1893 by the Imperial Federation Committee. Among British statesmen prominent Imperialists were Lord Beaconsfield, Lord Rosebery, and Joseph Chamberlain. To-day imperialism in general is no longer regarded with favour. More popular is the idea of co-operation between all the members of one family of equal nations.—

BIBLIOGRAPHY: J. A. Hobson, *Imperialism: a Study*; Earl of Cromer, *Ancient and Modern Imperialism*; Sir J. R. Seeley, *The Expansion of England*.

IMPERIAL PREFERENCE, British politico-economic conception. The movement began in Canada, where in 1898 the administration of Sir W. Laurier (q.v.) abandoned general reciprocity in trade for a policy of British preference in the granting of tariff concessions. Development of this policy, which was implemented at the Imperial Conference of 1902, had been slow, pending the change

(1931–32) in the British fiscal system from free trade to protection. Some progress was made, however, during the Great War, and British preference were enlarged under the Safeguarding of Industries Act, 1921. Apart from primary foodstuffs, motor-cars of Canadian manufacture, for instance, enjoyed preferential rates, while under the Safeguarding Act of 1925 imperial preference was attached to such products as cutlery, silver and silk, the Dominions meanwhile continuing to enlarge the preferential range.

Imperial preference should not be confused with **Empire Free Trade**, a political slogan introduced in 1930, expressing an ultimate aim, but ignoring the immediate need of the Dominions to protect their growing industries—a consideration which tends to limit the indefinite expansion of imperial preference.

IMPERIAL SERVICE ORDER, an order instituted by King Edward VII in 1902, and extended in 1909, as a reward for members of the Civil Service, home or colonial, who have served not less than twenty-five years (reduced to sixteen years in the case of unhealthy regions). The order consists of not more than 700 Companions, of whom 250 are members of the home Civil Service, 250 of the Colonial Civil Service, and 200 of the Indian Civil Service. The sovereign and the Prince of Wales are at the head of the order.

Companions are appointed on the recommendation of a Secretary of State, and are selected from those who have served in an administrative or clerical capacity. A star in silver and gold, with the inscription "for faithful service," is the special decoration of the order. A special medal is conferred for long service on civil servants of a lower grade who are not eligible as Companions. The initials I.S.O. mark the status of a Companion.

IMPETI'GO is an acute inflammation of the skin characterized by the formation of flat vesicles which become pustular. The disease is very common, and children are more often affected than adults. It is one of the commonest diseases seen in the out-patient department of any large hospital. Once infected, a person is very liable to infect other parts of the body by scratching, rubbing, &c., and where people are living in close contact the disease is rapidly spread from one to others. In men infection often occurs in the barber's shop. It very frequently arises as a secondary condition to other skin diseases where there is severe itching, like scabies, pediculosis, and prurigo.

Several types are recognized—the common type, where the vesicle appears, becomes purulent, and rapidly dries, forming yellow crusts. This type is much the most frequently seen among school children, in camps, in crowded houses, and wherever there is close association of a number of people. The face, especially in the region of the mouth and nose, is the most commonly affected part, but the neck, scalp, and hands are also frequently involved.

The intertrigo type occurs in the flexures, especially the groins, and there the impetigo takes a different form on account of the rubbing of skin surfaces and the warmth and moisture. It is a red, raw, oozing surface, and is usually more resistant to treatment than the common type.

The third type is known as the bullous, and in this form, instead of the vesicles rapidly drying up into crusts, they enlarge until blisters of a considerable size are formed. These large blisters become purulent and in time rupture, but the course of this type is much longer than that of the simple variety. Pemphigus neonatorum is now recognized as bullous impetigo of infants, and not a form of pemphigus as once supposed.

The treatment of impetigo is remarkably successful even in extensive cases. It is necessary to remove the crusts completely and apply a mild antiseptic ointment. When the condition is secondary to some other skin disease the latter has also to be treated, and the cure may therefore be slower.

IMPHAL (imp'hal), an Indian city, capital of Manipur state, with a British political agent, and cantonments. Pop. (1931), 80,003.

IMPLU'VIUM (Lat. *in*, into, *pluo*, to rain), in ancient architecture, a term which denoted, in the houses of the ancient Romans, a basin in the middle of the atrium or entrance-hall, below the *compluvium* or open space in the roof, to receive the rain. *See* ATRIUM.

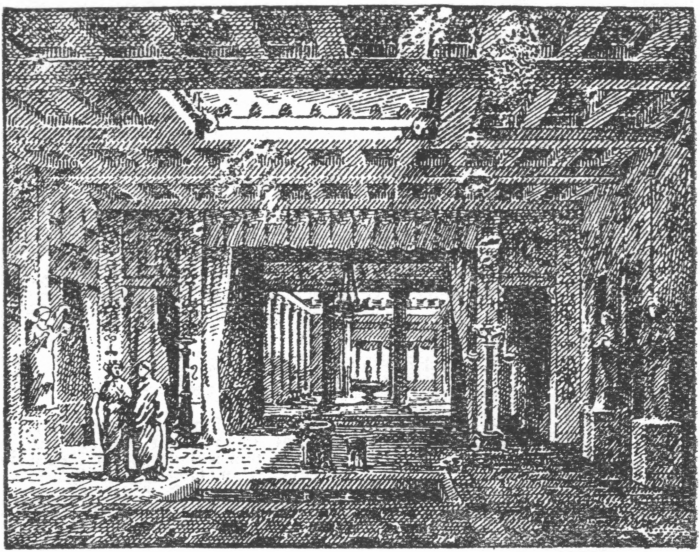
IMPORTS. *See* FOREIGN TRADE.

IM'POST, (1) a tax, tribute, or duty, particularly a duty or tax laid by Government on goods imported. (2) In architecture, the point of junction between an arch and the column, pier, or wall on which it rests. It is often marked by horizontal mouldings, though these may be absent.

Imposts have received various names according to their character. Thus, a *continuous impost* is where the mouldings are carried down the pier; a *discontinuous impost* where there are no mouldings, but the pier is of a different section from the arch;

shafted imposts are where the arch mouldings spring from a capital and differ from those of the pier.

IMPRESSIONISM is the term used to describe the aims and methods of a movement in art which originated in France during the nineteenth century and has profoundly influenced modern painting. In the widest sense, Edouard Manet (1832–83), J. M. Whistler (1834–1903), and their followers are the first Impressionists. In revolt against the academic conventions of their day, they sought to represent on canvas the actual visual impression made by an object or scene.



Roman Atrium showing Impluvium and Compluvium

To the eye an object appears as a number of tones of different shapes and degrees of light or dark. These are not all seen equally clearly, but with varying distinctness, according as the eye is focused and directed. In painting a subject, therefore, the Impressionists selected the most important of these shapes and tones to an observer, and emphasized them, more or less neglecting the rest.

A good example of the method is Manet's *Execution of the Emperor Maximilian*, in the National Gallery. More modern painters of similar tendencies are C. W. Furse (represented in the Tate Gallery), J. S. Sargent, and Sir William Orpen.

Another group of artists, almost universally called Impressionist, but better described as Luminarist, was headed by Claude Monet (1840–1926), Alfred Sisley (1839–99), and Camille Pissarro (1830–1903). They likewise aimed at recording accurately the visual appearance of a scene, and employed a method based on researches of Young and others into the nature of light and colour. Light falling on an object is broken up to a greater or less extent into its constituent parts (the seven colours of the spectrum), some of which are absorbed and others reflected to the eye. Thus every part of an object reflects to the eye rays of a definite colour, which are combined by the eye. What reaches the eye depends on such factors as the nature of the object, the direction of the light, and the distance of the object. An object can therefore be represented by a number of definite areas of various colours.

The Luminarists investigated with much care the exact colour constitution of shadows, half-tones, and high lights; and to reproduce natural conditions as closely as possible used only black, white, and seven colours of the spectrum. These were not completely mixed on the palette, but were applied in juxtaposed touches of more or less pure colour, which were left to be combined by the eye.

This 'divisionist' method partly had its origin in study of the work of Constable, Turner, and Delacroix, who constantly used broken colour (i.e. unmixed on the palette). It was pushed further by the Neo-Impressionists, Seurat (1852–90), Cross (1856–1910), and Signac, who used touches of pure colour of the same size and shape, on the ground that the seven colours of the spectrum combine in equal quantities to form white light.

Impressionist aims met with much criticism not only from academic painters, but from modern artists whose chief concern is with form and its arrangement in rhythmic design (*see* CUBISM; FUTURISM). The movement is scientific and analytic rather than artistic and creative. As a whole, Impressionist painters have paid comparatively little attention to the design of their pictures, whose charm lies mainly in pure and harmonious colour and in re-echoing the beauty of nature.

Their chief service to art has been in breaking down stifling conventions, in emphasizing the importance to an artist of a close study of nature, and in the development of a new and powerful technical method. The divisionist technique gives a quality and luminosity unobtainable otherwise, and has been freely employed by painters not Impressionist in aim, such as Cézanne, Renoir, and Degas.

IMPRESSMENT OF SEAMEN, the act of compelling persons, especially seafaring men, to serve in the British navy. The power of impressing seamen, though still existing, has fallen into abeyance since the conclusion of the general war in 1815. Impressment was of ancient date, and uniformly practised throughout a long series of years. It is also recognized in many statutes, such, for instance, as exempted certain persons from impressment, though the power of impressing is not expressly granted in any Acts of Parliament. *See* PRESS-GANG.

IMPRISONMENT. Detention in a gaol, or prison, for an offence against the law. In English law there are three kinds of imprisonment. Penal servitude is a punishment for serious offences and may be for life, which in practice is 20 years. Imprisonment with hard labour is for less serious offences; it cannot exceed 10 years. Ordinary imprisonment for minor offences is of three kinds. The person sentenced may be a first, second or third division prisoner. First and second division prisoners have an easier term than ordinary prisoners. *See* PRISON.

I'NA, or INE, king of the West Saxons in the seventh and eighth centuries. He succeeded Ceadwalla about 689, and after having obtained advantages over the people of Kent in 694, he turned his arms against the Britons, from whom he wrested Somersetshire and other parts of the west of England. He then made war on the Mercians; but the contest was terminated, without much advantage to either party, by a fierce battle in 715.

He resigned his crown and went as a pilgrim to Rome (728), where he passed the rest of his days in devotion. He was one of the principal legislators of the Anglo-Saxons. His laws are the oldest known to us among the Anglo-Saxon kings, except those of the Kings of Kent, and served as the foundation of the code formed by Alfred the Great.

INA'GUA, GREAT and **LITTLE,** two islands of the Bahamas, British West Indies, the former low and intersected with lagoons, and affording good pasture land; area, 665 sq. miles; pop. (1931), 667. Little Inagua is quite small; area, 36 sq. miles; pop. about 240.

INAJA' PALM (*Maximiliana regia*), a South American palm growing to the height of over 100 feet, with leaves 30 to 50 feet long. The spathes are so hard and woody as to serve for cooking food on the fire; they are also used as baskets. The fruit is edible.

INCANDESCENCE (Lat. *candescĕre*, to grow hot), the state of a body which glows or gives out light because of its high temperature. Bodies such as a red-hot poker, the mantle in a gas-flame, and the filament of an electric glow-lamp are instances of incandescent solids. The flames of candles, oil-lamps, and ordinary gas-jets are luminous because of the incandescent solid particles which they contain.

When a refractory solid is gradually heated, it first gives out invisible heat-waves; when it reaches a temperature of 370° to 470° C., it begins to become visible in the dark, and at a somewhat higher temperature glows with a dull red light. As the temperature rises there is an increase of red light and an admixture of yellow light, and with increasing temperature the spectrum colours are added in turn to the light emitted by the solid, until at some temperature near 1,000° C. the body is giving out light of all wave-lengths, and begins to appear white-hot. Further increase of temperature gives a whiter appearance to the light on account of the increase of the shorter wave-lengths; thus the light from the incandescent carbons of an arc-lamp comes from a source at 3,800° C.

An incandescent body while giving out light emits also a great proportion

of heat; in the most favourable case only about 9 per cent of the total energy radiated from the source is given off in the form of light.

INCANTA'TION, a certain formula of words, supposed to have some magical effect, especially if uttered with the accompaniment of certain ceremonies. The use of incantations is extremely old, the magi of Assyria and Babylonia being experts in the art. In ancient Egypt and India there were many magical formulæ in use. In the *Odyssey* 'a song of healing' is sung over the wound given to Odysseus by the boar.

The Second Idyll of Theocritus gives a detailed account of an incantation. A Coan girl named Simætha lays a fire-spell upon her unfaithful lover. She burns barley-meal, bay-leaves, a wax puppet, and some bran, and finally the herb hippomanes and a piece of the fringe of her lover's cloak. As she does so she rotates the magic-wheel (called 'wry-neck,' because originally one of these birds was bound to it) and repeats the formula "Wry-neck, draw the man to my house." This Idyll is imitated by Virgil in his eighth Eclogue, where the formula is "Draw Daphnis from the city home, draw Daphnis home, my song."

Incantations are still common as a part of popular medicine among the uneducated in many parts of England, having descended from the usage of Anglo-Saxon times. Some curious Old-English charms have been preserved; one is a charm to prevent bees from swarming. Earth is to be thrown over them, and the following formula recited:

Sitte ge, sigèwif, sigeth to eorthan!
naefre ge wilde to wuda fleogan!
beo ge swa gemindige mines godes
swa bith manna gehwilc metes and etheles!

(Sit ye, victory-wives, sink to earth!
Never fly ye wild to the woods!
Be ye as mindful of my good as is every man of meat and native-land).

As recently as 1858 it is reported that an old woman in the south-west of England attempted to cure her grandson of the ague by hitting three horse-shoes thrice with a hammer and reciting these verses:

Feyther, Son an' Holi Ghoast,
Naale the divil to this poast.
Throice I stroikes with holy crook,
Won for God, an' won for Wod, an' won for Lok!

Here the Trinity is invoked, and at the very same time God, Woden, and Loki, who is the spirit of evil. The holy crook, too, is evidently identical with Thor's hammer.

Incantations may sometimes have been beneficial in cases of illness, partly owing to the soothing effect of a song constantly repeated in a monotonous voice, and partly owing to the influence which faith has in effecting a cure.

INCARNATION. The term, in its specifically religious sense, means the assumption of physical form on earth by a divine being, who exists in this visible tangible form for an ordinary term of life. The idea is widespread among ancient religions, especially in those of Egypt and India. But usually the incarnation is temporary; the deity in question assumes successive forms of incarnation, no one embodiment being final. And the form assumed is not always human; it may be an animal.

Examples of both are to be found in Hinduism, ancient and mediæval, where the various and successive incarnations of Vishnu, Rama, and Krishna include both animal and successive human phases. Egyptian religion incarnated deities not only in sacred animals but even in plants, as well as in human beings. Even Greek and Roman religion admitted that deities could sometimes take human form temporarily for special purposes.

In Christianity there is only one incarnation, and it is in human form. This distinguishes Christianity from other religions; it is the religion of the incarnation, not a religion of incarnations, and incarnation denotes the assumption of a human personality by the divine power. The term is not Biblical, but it goes back to the idea expressed in *John* i, 14, "The Word was made flesh, and dwelt among us, and we beheld His glory, the glory as of the only-begotten of the Father." By 'the Word' (*Logos*) the writer meant the divine power, which, according to the religious philosophy of his age, was the creative organ of God, the reason or spirit which pervaded the world, and was the medium of revelation and fellowship between God and man. It is the Johannine equivalent for the Pauline "God was in Christ."

The assertion that the *Logos* or Word "became flesh" was the new thing; neither Stoicism nor Platonism could have reached this point. As Augustine says in his *Confessions* (vii, 9), "I did not read [in the Neoplatonists] that 'the Word was made flesh, and dwelt among us'"; their idealism could not embrace this tenet, which, as Augustine rightly saw, was central and distinctive in the Christian religion. The motive for the incarnation is the divine love, which imparts itself to men, by self-sacrifice. "God so loved the world,

that He gave His only begotten Son, that whosoever believeth in Him should not perish, but have everlasting life" (*John* iii, 16).

The incarnation is the entrance of God into human life, revealing the full reality of His presence; and this entrance is not by way of emanation, but through a human personality in Jesus. The fourth Gospel does not connect this with the virgin birth; the method is left unexplained. But the stress falls upon the truth of God's direct revelation in Jesus; 'glory' means the moral and spiritual manifestation of the divine nature, which is visible in Jesus, the Son of God, and which is meant to elicit faith. The object and the motive are brought out in the New Testament, rather than the mode of this realization of the divine in the human. Jesus in His human personality was divine; He completely revealed the divine nature and realized the divine end: this is the essential principle of the incarnation. Through Jesus the divine nature came into personal union with men.

The implicates of the incarnation are the essential affinity of the divine and the human, the innate desire of the divine to be known and received, and the capacity of the human for fellowship with the divine. The truth cuts at the deistic conception of the deity. "We are far too apt to limit and mechanize the great doctrine of the incarnation which forms the centre of the Christian faith. Whatever else it may mean, it means at least this—that in the condition of the highest human life we have access, as nowhere else, to the inmost nature of the divine. 'God manifest in the flesh' is a more profound philosophical truth than the loftiest flight of speculation that outsoars all predicates, and, for the greater glory of God, declares Him unknowable" (Professor Pringle-Pattison, *The Idea of God*, p. 157), or unattainable.

Furthermore, the incarnation implies that religion is not the reach of man's soul to the divine, but the voluntary access of God to man in love and pity; the initiative is with Him, and faith is the human response to the divine revelation in the incarnate deity.

Theologically the doctrine of the incarnation is linked to the doctrines of the Church and the sacraments, in which the extension of the incarnation is sought. The divine Presence, it is argued, is realized through the presence of the living Christ in the Body of the Church and pre-eminently in the sacraments. But its main theological connection is with the doctrine of the Trinity.

Granted that Jesus was the unique and final embodiment of God on earth, what, it is asked, was the relation of the Word or Logos to His personality? That He was simply the incarnation of the divine Spirit is not adequate. Nor is it enough to say (with the Arians) the Logos or Word in Jesus took the place of the soul in man, especially as this Logos was held to be only the highest of God's creatures, not essentially uncreated and divine.

The conscious or unconscious instinct in the Church has been to insist that (*a*) the incarnation meant the assumption of all that is in human nature, and (*b*) that it means the full action of God. Hence the Nicene Fathers often spoke of God becoming man rather than of the Word taking flesh. The title of Anselm's treatise, *Cur Deus Homo?* (Why did God become Man?), suggests this. For although Anselm in the twelfth century wrote this monograph in order to prove not only that the incarnation was necessary as the one means of atonement, but that the atonement was objectively necessary, his title reflects the interest which underlay the earlier tract of Athanasius, *De Incarnatione Verbi Dei* (On the Incarnation of the Word of God).

The incarnation is God taking action in and for mankind, out of love and mercy. The Nicene Creed sums up this belief in the words: "We believe . . . in one Lord Jesus Christ, the Son of God . . . who for us men, and for our salvation came down and was made flesh, entered humanity."

The question has been raised, whether the incarnation would not have taken place apart from sin? Does not the creation of man, it is argued, imply the further act of the incarnation in order to complete the divine purpose of perfecting humanity in Christ? This is a hypothetical question, and the instinct of the Church, which has never been purely speculative, has contented itself with recognizing that the object of the incarnation was redemptive, and that, in view of the facts of human sin and guilt, the incarnation is intelligible only in the light of the atonement.

According to the New Testament, He who atones is He by whom creation was carried out; the Son of God who became incarnate for the purpose of redeeming God's people was the eternal Son by whom God made the world. This is the nexus between the incarnation and creation. Christ, as the *Epistle to the Hebrews* puts it, is the "Son whom He hath appointed Heir of all things, by whom also He made the worlds; who . . . when He had by Himself purged our sins" (i, 2, 3).

The relation of Father-Son in the

Godhead is, on this view, eternal and essential; the creation is one act of this divine being, the incarnation leading up to the atonement is another, so that, as Athanasius summarily wrote, "He was God and became man, and that to deify us" by means of His redemptive power.—BIBLIOGRAPHY: C. Gore, *The Incarnation of the Son of God*; R. L. Ottley, *The Doctrine of the Incarnation*; J. Caird, *Fundamental Ideas of Christianity*; W. L. Walker, *The Spirit and the Incarnation*; F. Weston, *The One Christ*; P. T. Forsyth, *The Person and Place of Jesus Christ*; H. R. Mackintosh, *The Doctrine of the Person of Christ*; S. A. M'Dowall, *Evolution and the Doctrine of the Trinity*.

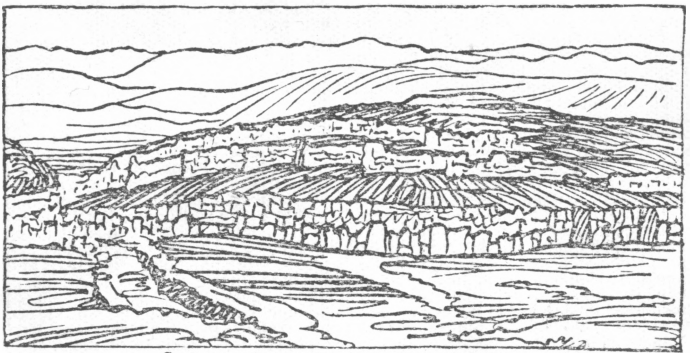
INCAS, an appellation which the natives of Peru gave to their kings and princes of the blood at the time of the conquest of the country by the Spaniard Francesco Pizarro. Inca means lord or ruler in the Quichua language, and the Incas were the reigning descendants of a conquering tribe or dynasty which, under the leadership of Manco Capac, 'a son of the sun,' united the various tribes into one theocratic state, They ruled the country for over four centuries, from about 1100 to 1533, when the last of the dynasty, Atahualpa was murdered by the Spaniards.

Long before the time of the Incas, however, the country had been inhabited by the Aymaras, and had been a powerful empire, as the archæological remains, such as those at Tiahuanaco, in Bolivia, still testify. The Incas, a warlike tribe living in the great central plateau of the Andes, gradually extended their sway over one region after another, and at last their empire extended from Quito to Chile, and from the Pacific coast to and beyond the Andes.

The story of the origin of the Incas is related as follows in the *Chronicle of Peru*: "This country had been a long time the theatre of all sorts of wars, horrible crimes, and dissensions, till at length there appeared two persons, Manco Capac and his wife Mamma Oullo, who gave themselves out as children of the Sun who were sent by Heaven to instruct and civilize the natives. Manco Capac built the city of Cuzco, settled laws and policy, and taught the people to adore the Sun, and he and his descendants took the name of *inca*, which signifies *king*, or great lord.

"The empire established by the Incas was a theocracy, and the ruler united in his person the highest temporal and spiritual power. He was at once the law-giver, and the law, the representative of divinity, and divinity itself. The Incas were wise and benevolent rulers, and the social laws of the country were most elaborate and equitable.

"Agriculture flourished, and was the cause of prosperity, as the land was divided among the various clans and owned in common. The inhabitants also excelled in the manufacture of textile fabrics, in weaving, and in the manufacture of pottery. They were excellent road builders, and one of their roads extended from Quito to Cuzco. The Inca Empire reached the summit of its power under Huayna Capac (1475–1525). His successor, however, Atahualpa, lost his empire and his life when the Spanish invaders appeared in 1533."—BIBLIOGRAPHY: Pedro Sarmiento de Gamboa, *History of the Incas*; Garcilaso de la Vega, *Royal Commentaries of Peru*; C. R. Markham, *The Incas of Peru*; W. H. Prescott, *Conquest of Peru*; E. G. Squier, *Travels and Exploration in the Land of the Incas*; Ch. Wiener, *Essai*



San Sanuana Fortress, Ruins of Inca fortress near Cuzco

sur les Institutions politiques, religieuses, économiques et sociales de l'Empire des Incas.

INCE-IN-MAKERFIELD, an urban district of Lancashire, England, forming practically a suburb of Wigan. There are coal mines, and cotton mills, and railway stock is manufactured. The county division of Ince returns a member to Parliament. Pop. (1931), 21,763.

INCEN'DIARY BOMB, a form of bomb first used by Germany in the European War. Primarily designed for use from air-craft, it differs from the more usual style of bomb in that its effect does not depend so much on the magnitude of the explosion, but rather on the release of some highly incendiary agents possessing a very powerful and rapid action. Incendiary bombs were chiefly used by the German air-service, in conjunction with the ordinary high-explosive bombs, in order to cause rapidly spreading conflagrations, and so increase the confusion incidental to a raid.

IN'CENSE, aromatic substances burned in religious rites on account of the sweet odour they emit. It was an offering pleasing to the gods, whilst it scared off demons and evil spirits. It was also used for sanitary reasons, and for the purpose of neutralizing the strong odour of bloody sacrifices. The custom of burning incense is ancient and widely spread. Among the Jews the practice was enjoined as part of the worship of the sanctuary (*Ex.* xxx), the ingredients of the incense also being specified, and it was to be burned on a special altar called the *altar of incense.*

This altar was made of acacia (shittim) wood, and was overlaid with gold, hence it was also called the *golden altar,* as distinguished from the altar of burnt-offering, which was made of brass. The incense was burned daily—morning and evening. In ancient Egypt, Assyria, Babylonia, India, Greece, and Rome incense-burning was part of the worship of the gods, and it is still employed as part of the Buddhist ceremonial.

Both the Greek and the Latin Churches use incense in worship, but the practice cannot be shown to have existed among Christians till after the first four centuries. Among Catholics it is used at every high mass, at consecrations of churches, in processions, and at funerals.—Cf. E. G. C. F. Atchley, *History of the Use of Incense in Divine Worship.*

IN'CEST, sexual intercourse within the prohibited degrees, which by the laws of England and Scotland are founded on the Levitical code. and include degrees both of consanguinity and of affinity. (Cf. Lev. xviii). In England, incest was formerly an ecclesiastical offence left to the jurisdiction of the spiritual courts. Now it is a misdemeanour, punishable by penal servitude for not less than three nor more than seven years, or by imprisonment not exceeding two years. In Scotland and some of the United States it is a criminal offence also. In Scotland it was punishable with death till 1887.

INCH (Lat. *uncia*), a measure of length, $\frac{1}{12}$ of a foot. By a statute of Edward II, an inch was defined to be the length of three grains of barley, placed end to end. Engineers use the symbol ″, e.g. 2′ 6″ = 2 feet 6 inches.

INCH'BALD, Elizabeth, English novelist and dramatic writer, born 1753, died in 1821. She married the actor Inchbald, who died in 1779. She continued on the boards about eight years, but retired from the stage in 1789, and devoted herself to literary pursuits. She wrote, among other works, two novels, which display much original thought and genuine pathos —the one entitled *A Simple Story* (1791), the other *Nature and Art* (1796). She edited *The British Theatre,* a collection of dramas, with biographical and critical remarks (25 vols., 1806–9); a collection of farces (7 vols.); and the *Modern Theatre* (10 vols., 1809).—Cf. R. S. Littlewood, *Elizabeth Inchbald and her Circle.*

INCHCAPE, EARL OF. British merchant and financier. Born at Arbroath 11th Sept., 1852, James Lyle Mackay went to India in 1874. He became a partner in a firm of merchants there and was soon one of the most influential business men in the country. From 1891 to 1893 he was a member of the Viceroy's legislative council, and in 1902 he went to China, where he concluded a commercial treaty between that country and Great Britain. He was then knighted.

Having settled in Britain, Mackay was a member of the council of India, 1897–1911, and was associated with some great industrial concerns. He was chairman of the P. and O. line, the National Provincial Bank, and he was also a director of the Suez Canal Co., and the Anglo-Persian Oil Co. He served on a number of commissions and committees, including the one on national economy presided over by Sir E. Geddes, and was chairman of the India retrenchment committee. After the war he sold for the Government an immense amount of shipping. In 1911 Mackay was made a baron and in 1924 a viscount. In 1929 he was created an earl. His

eldest son is called Viscount Glenapp. His daughter, the Hon. Elsie Mackay, lost her life while flying across the Atlantic in 1928 and her fortune of over £500,000 was devoted to reducing the national debt. Earl Inchcape died suddenly in his yacht, *Rover*, off Monte Carlo on 23rd May, 1932.

INCHCOLM (insh-kŏm'), a small island of Scotland, in the Firth of Forth, off the coast of Fifeshire, with the ruins of a monastery founded by Alexander I in 1123, of which Walter Bower, the continuator of Fordun, was abbot from 1418 to 1449.

INCHKEITH (insh-kēth'), a small island of Scotland, in the Firth of Forth, off the Fifeshire coast, with a lighthouse visible for 21 miles.

INCLINED PLANE, a plane forming with the horizontal plane any angle whatever excepting a right angle. It is one of the mechanical powers by which a small force under certain conditions is used to overcome a greater force. When a body lies on an inclined plane, part of its weight is supported, so that if a cord be fastened to it and pulled, a force less than the weight of the body acting in a direction parallel to the plane will prevent it from sliding, or will move it up the plane. Thus a heavy wagon is raised on an inclined road by a horse which would be quite unable to exert a pull equal to a quarter of the weight of the wagon. Neglecting friction, the force parallel to the plane necessary to raise the body is equal to the weight of the body multiplied by the vertical height through which it is lifted, divided by the distance it is moved along the plane. *See* STATICS.

INCLINOMETER. *See* DIPPING-NEEDLE.

INCLOSURE ACTS, Acts passed, some of them many centuries ago, to enable waste or common lands to be enclosed and occupied by private persons, the idea being that it was a benefit to the public at large that as much land as possible should be brought under cultivation, provided public rights in such lands were not wholly disregarded, which was often the case. Common or waste lands are still liable to enclosure, but public rights are now more carefully guarded, and a sufficient case has to be made out before the Board of Agriculture, the claims of all parties being considered and satisfied, and the settlement being sanctioned by Parliament.

INCOME TAX. History. The trifling assessment introduced by Pitt in 1798 is spoken of as the beginning of income tax in its modern form. Instituted as a War emergency measure it produced (in 1798) no more than £1,855,996; in 1815 it produced £15,642,338. It was modified in 1799, and a duty of 10 per cent on incomes of £200 or more was imposed. In 1803 the practice of charging incomes at their source was introduced, and continued until 1816 to meet the expenditure of the Napoleonic wars. After Waterloo the tax was dropped. It was revived in 1842, and notwithstanding efforts and promises to have it abolished, it has been maintained to the present time, and is now an indispensable source of public revenue.

Originally all incomes exceeding £6 were chargeable, but between 1842 and 1920 the exemption limit varied thus: exemption 1842, to £150; 1853, £100; 1876 to 1894, £150; 1894 to 1915, £160; 1915 to 1920, £130; in the 'emergency' Budget of September 1931, the limit was lowered to £100 for individuals other than married persons, the latters' personal allowance being reduced from £225 to £150, and allowances for children being reduced from £60 to £50 for the first child, and from £50 to £40 for each subsequent child. In 1907 a graduated scale of tax and differentiation between earned and unearned incomes was introduced by Mr. Asquith. In 1910 a super-tax, or additional duty of income tax, was imposed on the total incomes from all sources of individuals exceeding a certain limit, and in 1931 a sur-tax, which was increased by 10 per cent in the 'emergency Budget' of 1931. The 'normal' or maximum rate of tax rose from 2*d.* per £1 in 1875 to 1*s.* 3*d* in 1914. The 'standard rate' of Income Tax now stands (1933) at 5*s* in the £. Estimates revenue from Income Tax for 1933-4 was £24(millions, from sur-tax £51 millions and from Death Duties (Estates &c. duties) £75 millions.

The Income Tax Act, 1918, consolidated the law, while on the recommendation of a Royal Commissio radical changes were made by th Finance Act, 1920.

The Meaning of 'Income' i 1933. Income does not include (capital appreciation, e.g. stock-e change gains; (*b*) gifts; (*c*) official res dences or free residences not lettabl (*d*) co-operative 'dividends' on pu chases; (*e*) interest on Savings Cert ficates; (*f*) wound and disability pe sions and gratuities to the fightin forces; but the term does include oth interests, dividends, rents, feu duti business profits, wages (includi bonuses), deferred pay, pensions gene ally, compensation for loss of offic perquisites of office paid in or co vertible into money, &c.

In the case of dividends paid 'fr of tax,' the income is the gross s

from which tax at the normal rate must be deducted to give the actual amount received. When a death, marriage, divorce, &c., occurs during a fiscal year (6th April to 5th April), the income for the period prior to the date of such event is a year's income for tax purposes.

Computation of Profits in 1928. Income is dealt with in five classes or schedules, according to the sources from which it is derived. Schedule A comprises income from the ownership of land and buildings, the assessment being made on a fictitious income consisting of the rental or annual value less (*a*) one-sixth for repairs, &c., for buildings, and one-eighth for land; (*b*) land tax; (*c*) such burdens as ground rent, mortgage interest, &c.; and (*d*) in Scotland owner's local rates.

Schedule B deals with profits from the occupation of land, i.e. farming. By the Finance Act, 1922, the assessment is made on the annual value or one-third annual value when the land is not occupied for husbandry only.

Under Schedule C fall interests, annuities, &c., paid out of the public revenue, the tax being deducted at the time of payment, except in certain small half-yearly dividends not exceeding £2 10*s*.

Schedule D is divided into six Cases. (1) Trades, manufactures, and businesses assessed for any fiscal year on the full amount of the profits or income of the year preceding the year of assessment. Allowable deductions from the profits of each year are the rent or net annual value (Schedule A assessment) of the business premises, bad debts, a fair proportion of doubtful debts, actual cost of alteration of premises (but not of improvement), actual repairs and renewals less salvage, insurance premiums other than life premiums, interest paid to bankers, interest, &c., received less tax, Excess Profits Duty, and generally all expenses necessarily incurred in earning the income; but partners' salaries and drawings, interest on capital, annual interest or other outgoings (from which tax should be deducted), income tax paid, all expenditure of a capital nature, &c., must be added back to profits. Manufacturers, traders, and professional men may claim an allowance for wear and tear of plant and machinery. Tax deducted from interest, feu duties, &c., paid must be accounted for.

(2) Professions, employments, and vocations not charged under other schedules; also assessed as in Case (1).

(3) Interest and profits of an uncertain annual value not charged under Schedules A and C, e.g. interest on certain War Loan Stocks, discounts, &c., received without deduction of tax; assessed on the profits of the preceding year.

(4) Colonial and foreign securities (mortgages, debentures, and the like) assessed on the income of the year of assessment, whether remitted to the United Kingdom or not, or, in the case of persons not domiciled nor ordinarily resident here, on the sums remitted here in the year of assessment.

(5) Colonial and foreign possessions: (*a*) businesses wholly conducted abroad assessed as in (1) supra; and (*b*) stocks, shares, and rents assessed as in Case (4).

(6) Annual profits not charged elsewhere, e.g. from furnished lets, assessed on the actual or the average profits as the Commissioners direct.

Schedule E covers employment under companies, societies, and corporations, and the Crown. The assessment is on the actual profits of the year. Under Schedule E, 'weekly wage-earners' employed by way of manual labour are assessed half-yearly, except draughtsmen, clerks, and typists, &c.

Computation of the Tax in 1933. The income ascertained, the liability must then be determined. For tax purposes a wife's income from trade or other property must be added to, and reckoned as, her husband's. From earned income there is allowed a special deduction of one-fifth, with a maximum of £300. 'Assessable income' is the total income minus the allowance for earned income. If the assessable income does not exceed £100 in the case of an unmarried person or a widower or widow, and £150 in the case of a married person whose wife is living with or separately maintained by him, there is no liability.

Otherwise, to find the taxable income certain deductions are allowed: (1) a personal allowance of £100, and a further allowance of £50 if the taxpayer maintains or is living with his wife, plus five-sixths of any earned income of the wife up to a maximum of £45. (2) £50 for the first child, and £40 for each other child (including stepchild and adopted child) under sixteen years on 6th April of the fiscal year, or, though over such age, in full-time attendance at an educational establishment, and not receiving annually in his or her own right more than £50 exclusive of scholarships and bursaries. (3) £50 for a female relative of the taxpayer (widower or widow), or if no relative is available, any other person living with the taxpayer for the purpose of taking charge of any child for whom the foregoing allowance may be claimed. An unmarried person has a like deduction if the child is a brother or sister. (4) £25 in respect of (*a*) any aged or infirm relative main

tained by the taxpayer; (*b*) the widowed mother maintained by the taxpayer; and (*c*) a daughter resident with and maintained by the taxpayer, upon whose services he or she depends from old age or infirmity. In cases (*a*) and (*b*) the dependent's own income must not exceed £50. The term 'relative' includes relatives by marriage and adopted children.

The taxable income so ascertained is chargeable on the first £175 thereof at one-half the standard rate, and on the excess at the full standard rate. For 1932–3 the standard rate was 5*s.* per £1.

Life Assurance Relief. A remission of tax may be claimed on premiums paid on assurances on the life of the taxpayer or his wife up to one-sixth of the total income and 7 per cent of the sum assured exclusive of bonuses. The scale of reliefs are (1) half full rate (*a*) if assurance was made after 22nd June, 1916, however large the income; (*b*) in other assurances when aggregate income does not exceed £1,000; (2) three-quarters full rate when assurance was made on or before 22nd June, 1916, and the income is more than £1,000 and less than £2,000; (3) full rate when the income exceeds £2,000 and the assurance was made before 22nd June, 1916. The premiums are not a deduction from assessable income, but the relief is deducted from the tax as ascertained under the rules above set forth.

The Position of Non-residents. Individuals not resident in the United Kingdom have no rights of relief from British income tax (except in the case of interest on certain Government Stocks) unless they are: (*a*) British subjects; (*b*) in the service of the Crown or a missionary society or British protectorate; (*c*) resident in the Isle of Man or Channel Islands; (*d*) resident abroad for reasons of health after residence in the United Kingdom; or (*e*) the widows of persons who were in the service of the Crown.

—BIBLIOGRAPHY. W. E. Snelling, *Taxation*; *Income Tax and Super-tax Practice* (4th edition); S. Dowell, *History of Taxation and Taxes in England*; *The Acts relating to Income Tax*; *Your Income Tax* (Nelson & Sons).

INCUBA'TION (pathology), the period between the infection and the outbreak of the disease. During this period the organisms that cause the disease are growing, multiplying, and forming the poisonous substances or toxins that will attack the tissues and excite the symptoms of the disease. Before these specific indications of the nature of the ailment manifest themselves the toxins cause only such general symptoms as loss of appetite or sleep, &c. In epidemic and contagious diseases the period of incubation is well defined.

INCUBATION, the mode in which birds commonly bring forth their young, that of sitting on the eggs till they are hatched by the natural heat of the body. In general it is the female which undergoes the labour of incubation, but among some species, chiefly of monogamous birds, the male relieves the female while she seeks her nourishment; in others the male feeds her. Some birds, like the cuckoo, abandon their eggs to be hatched by others.

In a state of nature birds generally commence to sit in spring. The time of incubation varies with different species, but is always the same with the same species. In the hummingbirds it is 12 to 14 days; in the swallow and lark, 15; the canary, from 15 to 18; crow, 20; common hen, 21; pheasant, partridge, &c., 22; peacock and turkey, 30; swan, 40–45; cassowary, 62. —*Artificial incubation*, the hatching of eggs by prolonged artificial warmth has been long practised amongst the Egyptians and Chinese. Tank and hot-air incubators are largely used by modern poultry-farmers.

INCUM'BENT, in England the holder of a benefice (rector or vicar); in Scotland an episcopal clergyman. An incumbent holds for life, and may be removed only if he commits a grave ecclesiastical or moral fault.

INCUNAB'ULA, a term applied by bibliographers to editions of books printed during the early period of the art, and generally limited to works which appeared previous to 1500. The number of incunabula is supposed to be over 20,000.

INDEM'NITY (Lat. *in-*, negative, *damnum*, loss), a term frequently employed in politics and jurisprudence. It is used in various significations, but is usually applied to an Act of the legislature passed for the purpose of relieving individuals, especially in an official position, from the penalties to which they may have rendered themselves liable by some violation of the law whether by act or omission, or in case of members of Government in consequence of exceeding the limits of their strict constitutional powers.

INDEN'TURE (Lat. *indentare*, to cut into teeth), a deed entered into between two or more parties, and so called because duplicates of every deed between two or more parties were once written on one skin, which was cut in half, with a jagged or indented edge; so that when the duplicates were produced in court they were seen to belong to each other. *See* APPRENTICE

INDEPENDENT LABOUR PARTY (I.L.P.), British Socialist organization (not to be confused with the British Labour Party), founded at Bradford on 13th Jan., 1893, at a conference presided over by Keir Hardie. The original purpose of the I.L.P. was to secure direct parliamentary representation for organized Labour, and eventually to obtain collective ownership of the means of production. One of the most influential Socialist organizations at the beginning of the twentieth century, the influence of the I.L.P. was gradually weakened as the Labour party developed its system of local labour parties, and by the withdrawal from the I.L.P. as soon as its most influential members including Ramsay MacDonald and Philip Snowdon. In 1932, under the leadership of James Maxton, M.P. the I.L.P. seceded for the Labour Party and entered into an uneasy alliance with the Communist Party; but many branches and individual members who dissented from this decision left the party and formed a new organization called the Socialist League, which secured affiliation to the Labour party. The I.L.P. continues its existence but with a gravely alternated membership. Its official organ is *The New Leader* and its offices are at Lanark House, Seven Sisters' Road, London, N.4.

INDETERMINATE ANALYSIS, or **DIOPHANTINE ANALYSIS** (*see* DIOPHANTUS), in algebra, deals with the solution of equations, the number of which is less than the number of unknown quantities. The number of solutions of a system of this kind is, in general, infinite. In many problems, however, some restriction is placed upon the values of the unknowns, e.g. they may have to be positive integers, and then the number of solutions may be finite, or there may even be no solution at all.

As an example, we may take the question: How may a sum of £1 3*s*. 6*d*. be paid in florins and half-crowns? Let x = number of florins, y = number of half-crowns. Then $4x + 5y = 47$; $x + y + \frac{1}{4}y = 11 + \frac{3}{4}$; $(y-3)/4 = 11 - x - y$ = an integer, say p. Then $y = 4p + 3$, and, from the original equation, $x = 8 - 5p$. Since y is positive, p must be positive; and, since x is positive, p must not be greater than 1. Hence the only solutions are those for which $p = 0, 1$. Thus $x = 8$, $y = 3$; or $x = 3$, $y = 7$.

Diophantine equations may be of any degree. A specially interesting example is the quadratic $x^2 + y^2 = z^2$, which has an unlimited number of integral solutions. It may, in fact, be verified at once that the equation is satisfied if $x = a(k^2 - 1)$, $y = 2ak$, $z = a(k^2 + 1)$; where a, k are any positive integers. The similar equation $x^3 + y^3 = z^3$ can be proved to have no integral solution. *Fermat's Last Theorem* asserts that the equation $x^n + y^n = z^n$ has no integral solution if n is a positive integer greater than 2. Only special cases of this theorem have so far been proved, and a large money prize awaits the discoverer of a complete proof.

INDETERMINATE FORMS, or **UNDETERMINED FORMS**, in general mathematical analysis, are analytical expressions the value of which cannot be calculated, some operation being involved which is excluded by the laws of algebra, e.g. $0 \div 0$; $\infty \div \infty$; $0 \times \infty$. An indeterminate form has, strictly speaking, no value. When, however, the indeterminateness only arises when a variable which occurs in the expression is given one particular value, we can find the limit to which the value of the expression tends as the variable tends to this particular value; this *limit* is usually taken as the *value* of the indeterminate form. *Example*: $(x^2 - 4x + 3)/(x^2 + 5x - 6)$, when $x = 1$, takes the form $0 \div 0$. But the expression may be written $\{(x-1)(x-3)\}/\{(x-1)(x+6)\}$, and, *so long as x is not equal to* 1, we can divide numerator and denominator by $x - 1$. Hence the *limit* of the fraction, as x tends to 1, is the same as the limit of the fraction $(x-3)/(x+6)$, viz. $-\frac{2}{7}$.—Cf. G. A. Gibson, *Treatise on the Calculus*.

INDEXING. There are two main systems of indexing, and these may be described as the *book* and the *card* systems respectively, both of them existing in several modified but distinct branches, although the former is apparently being merged gradually in the card index, and few if any compilations appear nowadays in book form that have not been, either wholly or partially, constructed by its assistance. Loose-leaf ledgers, for example, are merely card index modifications.

By a further classification, a system may be termed *automatic*, *collective*, or *automatic and collective*. The card index is automatic; the book index may be either collective or automatic, but generally expresses the result of an automatic system, when it would be described as automatic-collective. The thumb index found in books is an automatic index, but does not carry the advantages of unlimited expansion which forms such a prominent feature of the card index and its modifications. Again, indexing may be *alphabetical*, *numerical*, *by subject*, or *mechanical*, but the latter is applicable only to the card index.

An encyclopædia is a good example

of an automatic-alphabetical index, as is also a dictionary, but it has now become customary to issue an appendix to every encyclopædia, as a collective-alphabetical index, not by reason of any breakdown in the automatic system, which is the simplest and best, but because of the modern tendency towards the embodiment of complete and authoritative treatises in the text.

Towards this end it is necessary to dissect the subject matter and to place each subdivision under its respective alphabetical title, linking up these subdivisions into a complete survey of the disembodied article through the collective index in the last volume. This is especially a necessity where a subject or part of a subject may be described in one of several ways, and is a powerful recommendation for card indexing which embodies a special cross-reference system whereby any subject may be traced, provided it has been expertly indexed.

General Indexing. Book indexing is self-explanatory, and all the principles are embodied in the card index, which is mainly dealt with here.

The card index in its simplest form consists of a box containing a series of standardized cards, and indexed by means of *guide cards* which are specially made, and usually carry a small slip or extension which projects above the standardized cards and affords a ready means of location. It is thus capable of expansion by the addition of cards or by the multiplication of boxes, and it has the advantage that, supposing it were used for correspondence, 'live' matter only need be allowed to remain 'in action,' as contrasted with registers where completed correspondence ('dead') cannot be segregated, a mass of unnecessary data accumulating daily and obstructing a rapid investigation of fact, which tends not only towards a general slowing down, but also towards a much depreciated efficiency, and is usually accompanied by a rapid increase in working expenses.

Numerical Indexing may be simple or complex, simple where the card numbers run consecutively, and complex where a *guide number* is modified by another *sub-number* or letter.

Examples: Card No. 1 is completed, and a second card is employed, numbered 1/2; a third would be 1/3, and so on. Alternatively a card would be No. 1, and others would be 1/*a*, 1/*b*, &c. Again, card No. 1 might have a distinctive colour, as opposed to the sub-numbered cards; or a *guide card* can be employed to represent the initial card, standardized cards representing the subdivision.

Mechanical Indexing is invariably accomplished by means of a power machine which perforates cards in special spaces, each perforation being distinctive in shape or dimensions, and indicating definite established facts.

Example: A large hospital registers the treatment of infectious cases by mechanical indexing. The Public Health Officer is desirous of a return showing the number of scarlet fever cases admitted during an epidemic, and the distinctive perforation for scarlet fever is △. The cards for the entire hospital are merely run through the machine, and those bearing this perforation are sorted out from all the others, enumerated afterwards or counted by the machine.

Subject Indexing demands the use of *guide* and *cross-reference* cards.

Example: A firm trades with a hundred other firms in London. Each of those firms is accommodated with a *guide card*, and a précis of all correspondence received or dispatched is recorded upon the *standardized cards* in the spaces provided therefor. The correspondence refers merely to two distinct classes of soap—washing-soap and toilet-soap, and each of these has a *guide card* accordingly, with a *cross-reference* upon *standardized cards* to the correspondence passing between the firm in question and the hundred others.

Alphabetical Indexing is almost self-explanatory. A *guide card* represents each letter of the alphabet, and subjects are indexed alphabetically, with cross-references to another letter where a description might be ambiguous in its meaning.

Example:

Subject—Card Index.
Guide Card—Card Index under 'C.'
Cross-reference—Index, Card (*see* CARD INDEX) under 'I.'

The examples are necessarily elementary, but are representative of indexing in its many commercial and professional ramifications. Elaborate systems provide for thousands of index cabinets, including cabinets for all kinds of miscellaneous emergencies, and a special system for keeping correspondence especially, thoroughly up to date. There is no system so accurate, so reliable, or so simple as the card index, but in its operation it demands care, intelligence, neatness, and general efficiency to a maximum degree. Any minor carelessness in entering matter upon a card or inade-

quately cross-referencing will suffice to cause absolute chaos, not only throughout the system, but in regard to the matter to which, if properly kept, it ought to afford a perfect key. —BIBLIOGRAPHY: A. L. Clarke, *Manual of Practical Indexing*; M. Petherbridge, *The Technique of Indexing*; H. B. Wheatley, *How to make an Index*; G. E. Skerry, *Indexing and Précis Writing*.

INDEXING, SPECIALIZED. The card index system has been extensively applied in both naval an d military administration, but the system has undergone considerable m odification to admit of an almost perfect specialization in definite subj ects exclusive to the navy and army. Special cards are issued to army offi ces, and these are subdivided as for ordinary précis indexing, but bear on the top an extra series of spaces for special entries, plus a triangular space, which is cut off when the card is completed.

INDEX LIBRORUM PROHIBITORUM ('list of prohibited books'), in the Roman Catholic Church, a title used to designate the catalogue or list of books prohibited by ecclesiastical authority, on account of the heretical opinions supposed to be contained in them or maintained by the authors or editors of them: when the list or catalogue is of books allowed to be read after correction or alteration, agreeably to the orders of the Papal authorities, it is termed *Index Expurgatorius*.

Such prohibitory catalogues have been in use from a very early period in the history of the Church, commencing with a list of prohibited books drawn up by a council held at Rome in A.D. 494, or even earlier with the proscription of the writings of Arius. These prohibitions, in fact, were often issued by other than the Papal authorities. In 1408 a synod at London prohibited the reading of the books of Wycliffe. In 1544 the Faculty of Theology in Paris published a catalogue of books censured by them, and in 1546 the University of Louvain published an index of books regarded as dangerous.

The indexes of the Church were a subject of consideration at the Council of Trent, which referred the business of drawing up a complete index to a select committee under the Pope. Their Index was published in 1564, and besides the catalogue of prohibited books contains general rules relative to such books. In 1586 a special ecclesiastical board, the Congregation of the Index, was formed, consisting of a cardinal-prefect, with other cardinals and examiners of books, with authority to judge of new works, to indicate those of which the reading is entirely prohibited, and those which are permitted after correction, and also to grant to learned and pious men the right of reading prohibited works.

The most important editions are those of Alexander VII in 1664, and of Benedict XIV in 1753. Under Leo XIII an entirely new Index was drawn up in 1900, and reprinted under Pius X in 1904 and 1907. In 1607 the first volume of an *Index Expurgatorius* was published at Rome, edited by the Dominican Brasichelli. In Spain the Inquisition maintained its right to issue its own index, the last edition of which, dated 1790, was reprinted, with a supplement in 1805. The Spanish indexes, which are mostly both prohibitorial and expurgatorial, contain most of the books found in the Roman index and many others besides. The Congregation of the Index may give permission to any Roman Catholic to read and to keep prohibited books.—BIBLIOGRAPHY: T. Hurley, *Commentary on the Present Index Legislation*; A. Boudinhon, *La Nouvelle Législation de l'Index*.

INDEX NUMBERS are a device for measuring the average variation in price of a number of commodities, chiefly used to compare the purchasing power of money at different times or places, or to throw light upon some general tendency affecting all prices, such as a change in the amount of currency in circulation. When prices are quoted in different ways—wheat by the bushel, coal by the ton, milk by the gallon, and so on—these prices are incomparable, and an average of them has no meaning. But if the price of a number of articles each be expressed as a ratio of its price at a given time (or of its average price over a given period), known as the base, numbers so obtained for each article can be compared and an average taken. The usual plan is to calculate each price as a percentage of the base, and to combine the results by taking an arithmetic average; but sometimes a geometric mean is used.

In the *Statist* index numbers (formerly known as Sauerbeck's) the prices at different times of forty-five articles are represented by a percentage of their average price from 1867 to 1877, and are combined by an arithmetic average.

The commodities chosen for an index number depend on its purpose. An index number for measuring changes in the purchasing power of money should theoretically cover a large number of articles, but in practice a selection of number of staple commodities is found sufficient. The prices taken are usually wholesale

market prices (as in the *Statist* number), or declared values in foreign trade.

Index numbers of retail prices or wages are rarely satisfactory, as it is difficult to be certain that the same thing is being paid for at different times or places. Nevertheless, since 1915 the Ministry of Labour has issued an index number designed to measure the average increase in the cost of maintaining the pre-war standard of living of the working classes, based on the actual prices paid for food, clothing, rent, fuel, and light. This number is open to grave theoretical objections, but is of considerable practical importance, as it has formed the basis for many recent wage agreements.

For an index number designed to show the influence of a force affecting all prices, the relative importance of the articles chosen need not be considered. Thus Jevons, in his famous calculations to discover the effect in prices of the gold discoveries during the nineteenth century, simply took a geometric mean of the percentage variations in price of thirty-nine selected articles. In other index numbers some form of 'weighting,' according to the importance of the article in consumption or in business, is usually adopted. This may be done roughly by including more important articles in several forms or stages of production, e.g. wheat and flour, iron and steel, and in practice this is found sufficiently accurate, as compared with more elaborate methods.

The *Statist* number, which extends from 1846, is one of the most useful for general purposes. The special purpose of Jevon's numbers (to be found in his *Investigations in Currency and Finance*) must be borne in mind, but it has the advantage of going back to 1782. The *Economist* index number, first published in 1868, originally covered twenty-two articles, and now includes forty-four articles. The Board of Trade index number runs from 1871, and is based on the declared import and export values of forty-five articles.

The method of index numbers can be applied to statistics other than prices, where things otherwise incomparable have to be compared and combined. For example, a number representing the total amount of work of every kind done in a factory at a given time can be calculated. At present, however, this application is of no great public importance.

Below are the *Statist* numbers and the Ministry of Labour Cost of Living numbers for recent years.

*	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.	1932.	1933.
Statist (Wholesale Prices) (Average of 1924 = 100) ..	99·9	101·4	88·6	85·7	84·6	83·6	76·9	64·0	63·4	59·5
Cost of Living (July, 1914 = 100)	177·3	178·5	172·2	171·0	165·3	165·3	162·2	150·7	146·2	139·8

* The figures in each case are those of the first quarter of the year.

INDIA, a name generally applied to the whole of the British Indian Empire, which includes Burma and all those areas in the great Indian Peninsula which are directly or indirectly under British rule or protection. More popularly, however, it is taken to include in addition the absolutely autonomous states of Nepal and Bhutan, and the French and Portuguese coastal settlements (Pondicherry, Karikal, Goa, Daman, &c.).

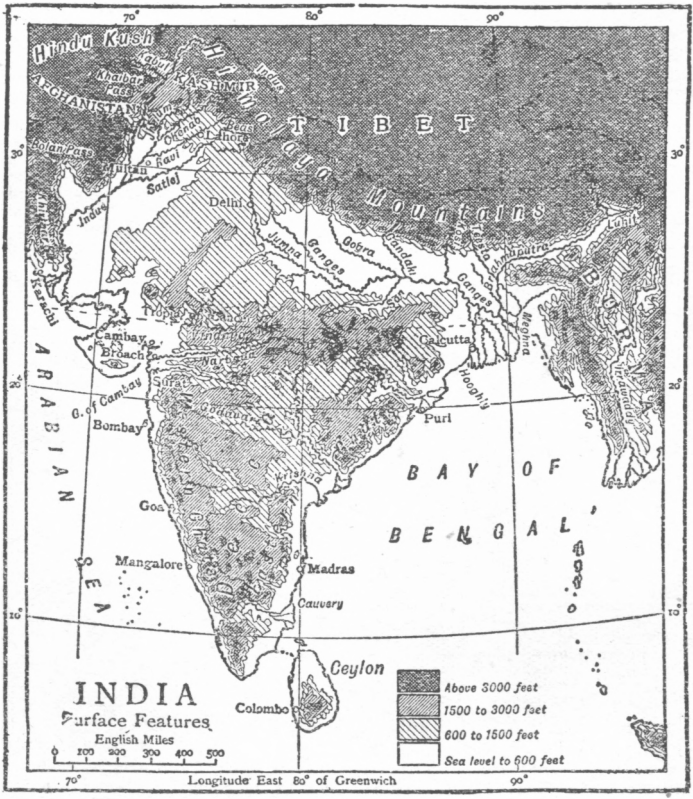
Physiography. *The Indian Peninsula* is bounded by Persia, Afghanistan, Turkistan, Tibet, Burma, the Bay of Bengal, the Indian Ocean, and the Arabian Sea. It is almost inaccessible from the north owing to the great barrier mountain ranges (the Himalayas, the Hindu Kush, and the Suleimans), and has a length of approximately 1,900 miles. Immediately south of the Himalayas lies the vast North Indian plain containing the most fertile and densely-populated portions of the empire. South of the northern plain rises the triangular plateau of the Deccan. Its northern scarp is formed by a number of hill ranges known as the Vindhya Mountains. The other two sides of the Deccan are formed by the Eastern and Western Ghâts, which stretch southwards along the eastern and western coasts of India.

The vast North Indian Plain is watered by three distinct river systems which collect the drainage of both the northern and southern slopes of the Himalayas. The first of these system rises on the northern side of the Himalayas, and makes way through their western ranges into the Punjab as the Indus and Sutlej. The second rises in the same quarter, but enters India on the east as the Brahmaputra of Assam and Eastern Bengal. *I*

these two systems convey to India the drainage of the Tibetan slopes of the Himalayas, so the third system, the Ganges, with its tributary the Jumna, drains the southern slopes; traverses the central part of the Indian plain; unites near its mouth with the Brahmaputra, and forms the immense delta known as the Sundarbans.

and Jumna canals alone irrigate an aggregate area of about three million acres. The coasts of India have very few indentations, and consequently few good natural harbours. The south-east coast is known as the Coromandel coast, and the south-west as the Malabar coast.

Climate. In Southern India the



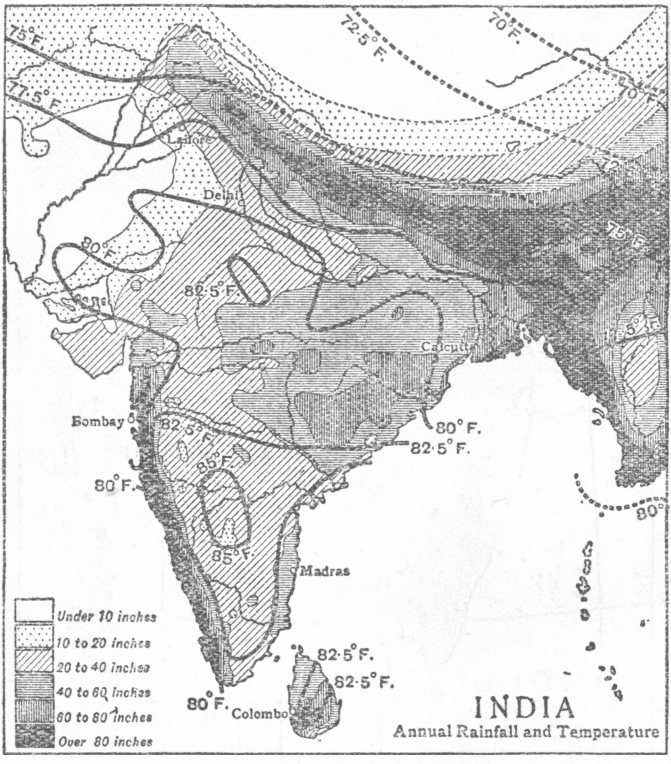
In the Deccan the Narbada and Tapti carry the drainage of the southern slopes of the Vindhyas into the Gulf of Cambay; and the Godavari, the Kistna, and Cauvery rise in the Western Ghâts and reach the sea on the eastern shores of the peninsula. The Indian rivers in the lower portions of their courses afford a natural system of irrigation, but in the higher parts an extensive system of canal irrigation is required. The Ganges

climate is tropical. Among the higher elevations of the Himalayas an Alpine climate prevails. The Deccan and the slopes of the Himalayas enjoy a temperate climate. The climate of the Nilgiris, a hill district in Madras, is healthy, and several sanatoria for Europeans have been established there, as well as on the Himalayas. The chief hill stations are Darjeeling in Bengal, Landour and Mussoorie in the United Provinces, Simla and

Murree in the Punjab, and Yercaud in Madras. Throughout the entire country there are only two annual seasons, the dry season and the rainy season. The rainfall chiefly depends upon the *monsoons* (q.v.).

Flora. The flora of India offers nothing very distinctive. In the Himalayas it has to a considerable extent a European character; in the south it is tropical. Many plants of temperate climates, such as wheat, barley, and European vegetables, are grown in the north-western and other parts, while various products of warmer regions are also cultivated, such as cotton, rice, indigo, oil-seeds, jute, tobacco, sugar-cane, coco-nut, date and other palms, and spice. Coffee, tea, and cinchona are now extensively cultivated in India, the first particularly on the slopes of the Western Ghâts and in the Nilgiris. The tea-plant is also grown in the south, but especially in Assam and along the lower slopes of the Himalayas.

European fruits abound, and among cultivated fruits may be mentioned the mango, plantain, pomegranate, citron, orange, lime, melon, fig, almond, pineapple, guava, jack, and tamarind. Amongst trees the teak forests under the protection of the Government are of most economic value. The bamboo, the banyan, the sappan, and the saul are all characteristic of Indian forest scenery. In Bengal and some other parts the natives live chiefly on rice, but millet is the staple food grain, barley, wheat, with sweet-potatoes, onions, and garlic, being also largely used. Opium is cultivated in Bihar, Benares, and Malwa.



Fauna. The vast forests of India

are tenanted by great numbers of wild animals, birds, and reptiles. Large herds of elephants are still met with in Nepal, Eastern Bengal, and the Nilgiris; the bear, the wild boar, and rhinoceros hiefly in the woods of the Eastern Himalaya; the tiger is found in every part of the country; the lion is now almost extinct. Other carnivorous mammals are the leopard or panther, cheetah, wolf, fox, jackal, and hyæna. Several antelopes and deer, wild sheep and goats, the wild ass, the great gaur ox or 'bison,' and the wild buffalo are among the fauna. Snakes and reptiles in all varieties are very numerous, and the cobra and other snakes cause numerous deaths. Amongst domestic animals are oxen, camels, horses, mules, sheep, and goats.

Of birds, eagles, vultures, the peacock, parrakeets, and the adjutant-bird are characteristic species. Fish are plentiful and in great variety.

Minerals. India is richly endowed with minerals, including coal (Bihar and Orissa, Assam, Central Provinces, and Western Bengal), iron ore (Bengal, Bihar and Orissa), manganese ore (Central Provinces, Madras, Central India, Mysore), gold (Mysore, Madras, Hyderabad), petroleum (Burma, Assam, Punjab), &c. The total value of mineral products is £20,000,000 to £30,000,000 per annum.

Government. *British India* is governed in accordance with various parliamentary statutes which are now consolidated in the Government of India Act, 1915, the Government of India (Amendment) Act, 1916, the Government of India Act, 1919, the Government of India (Leave of Absence) Act, 1924, and the Government of India (Aden) Act, 1929. The administration was transferred from the East India Company to the Crown in 1858, and by the Royal Titles Act (1876) the Sovereign of Great Britain has the additional title of Emperor (or Empress) of India. India holds a unique position amongst British overseas possessions, for though she does not possess the full status of a dominion, she is being educated and developed with a view to attaining responsible government, and already has some of the privileges enjoyed by countries like Canada and Australia (*see* COLONY).

In England the administration of the Indian Empire is entrusted to the Secretary of State for India, who is assisted by a legislature of two houses, one is the Council of State, the other, an elected legislative assembly which was created in 1921. There is also a High Commissioner with offices at India House, Aldwych, a fine building opened in 1930. The cost of the India Office is borne by the Imperial Exchequer. In India the supreme executive authority is vested in the Governor-General in Council (i.e. the Government of India). The Viceroy (Governor-General) is appointed by the Crown. The Indian Legislature consists of the Viceroy and two Chambers, the Council of State and the Legislative Assembly.

By the Government of India Act, 1919 (which aimed at paving the way for responsible government), the provincial subjects were definitely committed to the Provincial Governments. These Provincial Governments now consist of an Executive Council and Legislative Council. The executive authority is vested in the Governor of the Province, who is assisted by a Council. Each of the large Provinces is under a Governor. Administrative changes embodied in the Government of India Act (1919) resulted in India being divided into fifteen administrations (*see* following table). In 1921 a Chamber of Princes was established to discuss matters of Imperial concern.

Administration.	Area in Sq. Miles. 1931	Population. 1931
Ajmer-Merwara	2,711	560,292
Andamans and Nicobars ..	3,143	29,463
Assam.. ..	67,334	9,247,857
Baluchistan ..	134,638	868,617
Bengal ..	82,955	51,087,338
Bihar & Orissa	111,702	42,329,583
Bombay Presidency (Including Aden) ..	151,673	26,398,997
Burma ..	233,492	14,667,146
Central Provinces and Berar ..	131,095	17,990,937
Coorg	1,593	163,327
Delhi	573	636,246
Madras ..	143,870	47,193,602
North-West Frontier Province ..	36,356	4,684,364
Punjab ..	105,020	24,018,639
United Provinces ..	112,191	49,614,833
Totals ..	1,318,346	289,491,241

The Round Table Conference (1931–1932) decided upon a federal organization for India, and a committee in London drafted a federal constitution. In a White Paper issued in 1933 the Government made proposals for constitutional reforms.

The Government of India is responsible for the internal administration of Aden and the Island of Perim (in the Red Sea) (*see* ADEN), and the Laccadive Islands are included in the

Presidency of Madras. There are also a number of native or feudatory states. Their area is 490,333 sq. miles, and their population (1931), 63,346,537, the most important being Hyderabad, Kashmir, Mysore, Travancore, Baroda, Baluchistan States, Rajputana Agency, Central India Agency, Bombay States, Madras States, and Bengal States. Total area of Indian Empire (1931), 1,808,679 sq. miles; pop. (1931), 352,837,778.

Defence. The army in India consists of the British regular forces, the native army, the auxiliary and territorial forces, the native Army reserve, the Indian State forces, and units of the Royal Air Force. The strength of the British army in India in 1932 was 59,773, and of the native army 162,600. The Royal Indian Marine has four sloops, two patrol vessels, and two surveying vessels. (*See* ARMY.)

Sources of revenue, &c. The chief source of revenue is the land tax. Under British rule the aim has been to do away with communal ownership of land and to establish private tenure. There are two kinds of land tenure, *zamindari* and *ryotwari*. Where the *zamindari* tenure prevails single proprietors own huge estates (which they let out) and pay a fixed assessment on the rental. Under the *ryotwari* system, however, each petty proprietor holds direct from the State to which he pays his tax. Opium, which forms a Government monopoly, and salt, on which a considerable duty is levied, are two other important sources of revenue, besides the customs and excise. Since 1926, however, the Government of India have been reducing the export of opium, except for medical and scientific purposes, with a view to extinguishing it completely by 1935.

Currency, Weights and Measures. The chief money denomination is the *rupee*, which is divided into 16 *annas*, the anna again being equivalent to 4 *pice*. In 1927 the Indian Currency Act standardized the rupee at 1*s.* 6*d.* (gold). The sum of Rs. 100,000 (written 1,00,000) is called a *lakh*, and of Rs.10,000,000 (1,00,00,000) a *crore*. The primary standard of weight, called the *seer*, is equal to 2·057 lb. A weight in common use is the *maund*, in Bengal 82 lb. 2 ozs. 2 drs. in Bombay 28 lb., in Madras 25 lb. The imperial yard (known as the *guz*) is the standard measure of length.

Production and Industry. The chief industry is agriculture, which employs about 230,000,000 people, or 70 per cent of the total population. Almost 240,000,000 acres are sown each year (including 20,000,000 acres sown twice). The following table gives the areas under the chief crops in 1931–32:

Crop.	Area in Acres.
Rice	84,034,000
Wheat	33,749,000
Cotton	23,522,000
Rape and mustard	6,117,000
Groundnut	5,562,000
Sesamum	5,491,000
Linseed	3,241,000
Sugar-cane	2,886,000
Jute	1,862,000
Castor	1,563,000
Tea	805,800*
Rubber	172,100*
Coffee	160,900*

* Figures refer to Calendar year 1930–31.

In 1930–31, 49,690,527 acres were irrigated by tanks, wells, perennial canals, or inundation canals. Forests covered (1929–1930) 249,710 acres, 107,753 acres being reserved. The principal manufactures are connected with textiles, particularly with cotton. The following table gives the largest manufacturing industries and the *approximate* number of establishments employing over fifty hands in 1930:

Kind of Establishment.	Number.
Cotton ginning and pressing factories	2,090
Rice mills	1,615
Tea factories	959
Printing, bookbinding, &c.	338
Cotton spinning and weaving mills	298
Oil mills	298
Engineering shops	249
Saw mills	248
Jute presses	186
Jute mills	115
Motor works and coach building	97
Railway and tramway workshops	95
Brick and tile works	85
Foundries	76
Electrical works	73
Sugar factories	54

Irrigation. The necessity for irrigation in many extensive areas, owing to the insufficiency or uncertainty of the rainfall, has long been recognized in India, and many of the irrigation works now administered by the Public Works Department are old native works restored or extended. The area of India irrigated by Government works during the years 1927–30 was about 30 million acres, and the money expended on irrigation works in modern times has been about

£30,000,000, irrigation and inland navigation being closely connected in many districts. Tank irrigation is very common in some districts, especially in Southern India, and the tanks are mostly of native origin. Another method, which prevails over large areas in all the provinces, is that by wells.

Irrigation canals, all the most important of which have been constructed since the British occupation, are of two kinds, inundation and perennial. The latter are furnished with permanent headworks and weirs, and are capable of irrigating large areas throughout the year, independently of the local rainfall; whilst the former, which are peculiar to Sind and the Punjab, are simply earthen channels supplied with water by the annual rise in May of the Indus and its affluents. The total area irrigated by canals in 1931 was 25,874,981 acres. There are no large irrigation works in Burma, but a considerable amount has been expended on river embankment and drainage works, and on making navigable channels.

Transport. Prior to the construction of railways, the chief means of transport and trade were the Ganges and the Indus. These and other rivers, and also several of the irrigation canals, still supply a means of internal navigation. There were in 1932, 42,281 miles of railways, about 31,709 being Imperial States lines and 6,369 native state lines. There were also 31 wireless stations. A ferry across Adam's Bridge connects the termini of the Indian and Ceylonese railways. There are in India over 55,000 miles of metalled roads, and about 225,000 miles of unmetalled roads.

Commerce. The total value of exports (including treasure) in 1931–2 was £175,090,243, and of imports £100,222,814. The principal items of export and their value in pounds sterling in 1931–2 are given in the following table:

Commodity.	Value in £ Sterling.
Cotton (raw) ..	17,585,420
Jute (manufactured)	16,443,190
Tea	14,578,041
Rice	13,607,439
Seeds	10,941,231
Jute (raw)	8,391,047
Hides and skins and leather goods ..	6,756,834

The value of opium exports in 1931–2 was £651,984. In 1932 exports to the value of £32,314,548 went to and imports to the value of £34,680,363 came from Britain. The trade across the land frontiers is steadily increasing.

People. India has been peopled by several races which have now become mixed. The Hindus, partly of Aryan or Indo-European origin, are by far the most numerous. In the south dwell people of a Non-Aryan and Dravidian stock, while other races are Burmese, Arabs, Parsees, Mongolians, &c. Europeans number 319,000 (including 115,600 born in the United Kingdom), and there are about 80,000 Eurasians.

Languages. There are 220 different languages spoken in India. Aryan languages (of which the chief dialects are Hindi, Marathi, Punjabi, Bengali, Uriya, and Gujarati) are spoken by 257,488,000, while the Dravidian languages (Tamil, Telugu, Kanarese, Malayalam, &c.) are spoken by 71,642,000. Hindustani, a corruption of Hindi mixed with Persian and Arabic, is the language spoken by the Mahommedan conquerors of India, and has been adopted as the official language and means of general intercourse throughout the peninsula.

Religion. The leading religion is Hinduism, which had in 1931 239,195,140 adherents. Large numbers in the north and north-west are Mahommedans (77,677,545). Buddhists number 12,786,806; Parsees or Fire worshippers 100,000; Sikhs 4,335,771; Jains 1,252,105; Zoroastrians 109,752; Jews 24,141; and adherents of tribal religions 8,280,347. There are 6,296,763 Christians, of whom 1,823,079 are Roman Catholic. Missions are active. Among the Hindus the caste system still prevails.

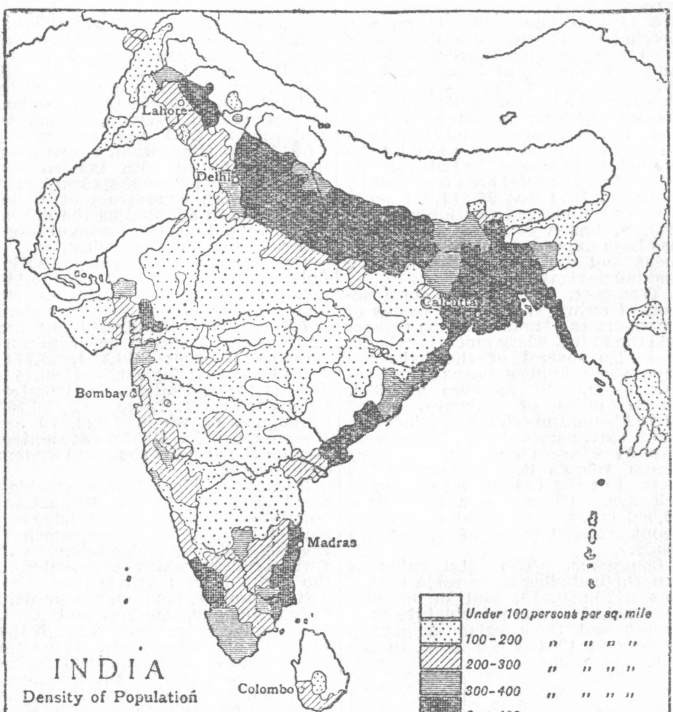
Education. Education is now making rapid progress, though of the total population only about 23,000,000 can read and write. There are numerous English and vernacular schools and various colleges which are affiliated to the eight federal universities—Calcutta, Bombay, Madras, the Punjab, Patna, Nagpur, Andhra, and Agra. These universities teach through the various scattered colleges. There are also six teaching and residential universities—Dacca, Allahabad, Lucknow, Rangoon, Annamalai, and Delhi, the Hindu university at Benares, the Muslim university at Aligarh, and the two Indian State universities of Mysore and Hyderabad (Osmania). There are also numerous special, art, industrial, engineering, medical, commercial, training, &c., schools. *See also* BURMA and articles on separate states, &c.

History. The early history of India is obscurely written in the myths of Sanskrit literature, but the first fact of any certainty is that about the year 2000 B.C. or even earlier, an Aryan people of comparatively high civilization descended from the mountain regions of the north-west into the

plains of India and subdued the original inhabitants there. The expedition of Alexander the Great to the Indus in 326 B.C. gives us a momentary glimpse of that part of India; but between his invasion and the Mahommedan conquest there is little authentic political history of India.

In the third century B.C. Buddhism was established throughout India, but it afterwards entirely gave way to Brahmanism. The first six centuries of the Christian era were occupied by struggles between the native dynasties and invaders from the north-west. In the eighth century the tide of Mahommedan conquest began with Kasim's advance into Sind (A.D. 711). But the Mahommedans were again driven out in 828, and for more than 150 years afterwards the strong feudal and tribal organizations of the northern Hindu kingdoms were a barrier to the Mussulman advance. At length in the year 1001 Mahmud of Ghazni reduced the Punjab to a province of Ghazni, and the Mahommedan power was gradually extended into Southern India. In 1398 Timur or Tamerlane led a great Mogul (or Mongol) invasion of India, and after sacking Delhi retired into Central Asia.

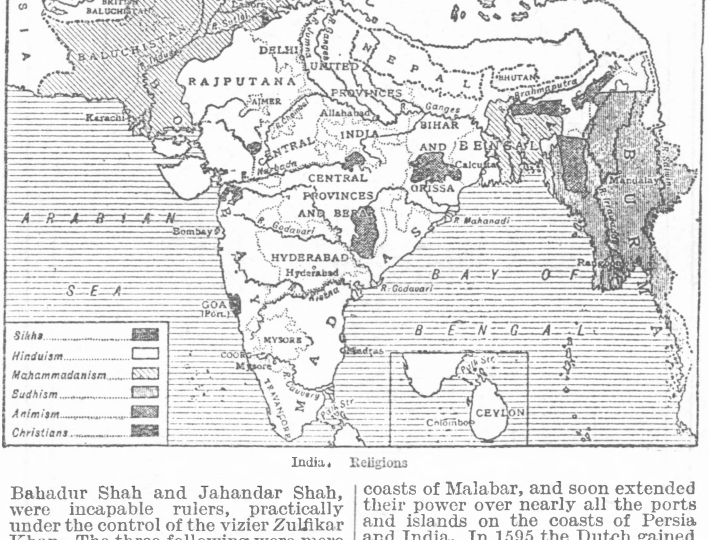
In 1526 Sultan Baber, a descendant of Tamerlane, founded the Mogul Empire in India. His grandson Akbar reigned from 1556 to 1605, and extended his power over most of the peninsula, being distinguished by his justice and his tolerance in matters of religion. His son Jehan-ghir received an ambassador from James I in 1615. During the reign of his successor, Shah Jehan, famous for his architectural magnificence, the Mahrattas began to be formidable in Southern India. Shah Jehan was deposed in 1658 by his youngest son, Aurangzib, who made war successfully with the Afghans, the Rajputana tribes, and the rising power of the Mahrattas. The Sikhs, a



Hindu sect, formed a religious and military commonwealth in the Punjab in 1675.

On the death of Aurangzib in 1707 the Mogul Empire began to decline, Mahommedan viceroys like the Nizam and the ruler of Oudh asserting their independence, while the great Hindu states of the Sikhs, the Rajputs, and the Mahrattas began to harass the decaying empire. In 1738 Nadir Shah of Persia swept down on Hindustan, sacked Delhi, and carried away sixty millions sterling of treasure. The two immediate successors of Aurangzib, fought between the Afghans and the Mahrattas, and ended in the defeat of the latter. The victor Ahmed Shah, still recognized the Emperor Shah Alam, but the dignity was little more than nominal. Shah Alam was succeeded in 1806 by Akbar II, who was succeeded in turn by Mahommed Bahadur Shah, the last Mogul emperor, who died at Rangoon a British State prisoner in 1862.

In the beginning of the sixteenth century the Portuguese, following in the wake of Vasco da Gama, had established factories and fortresses on the



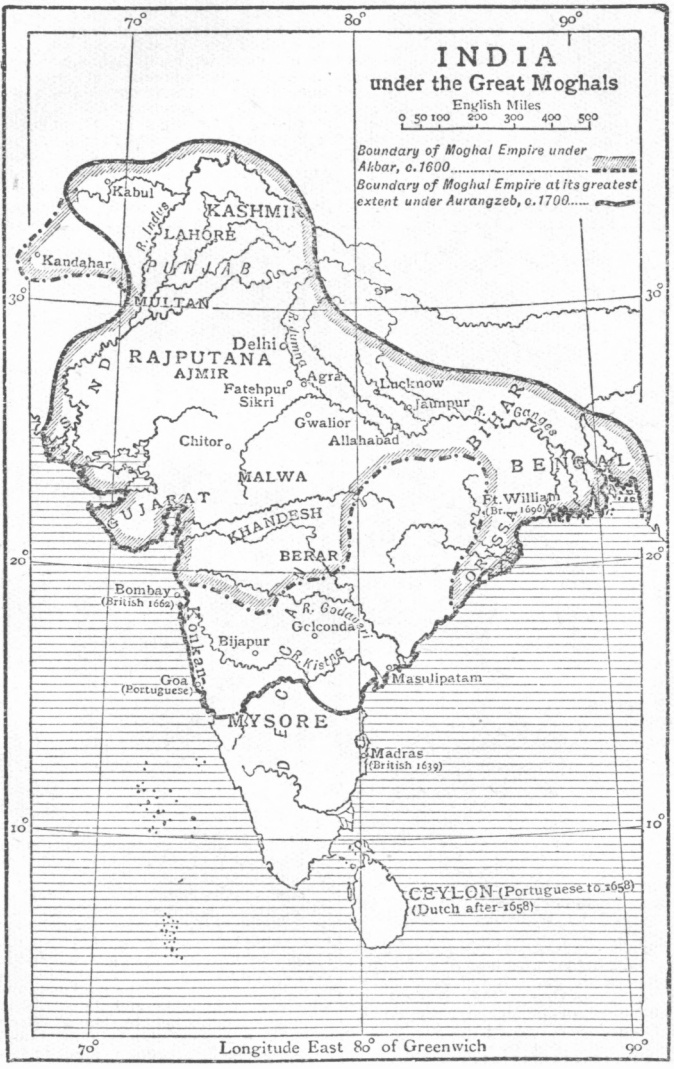
India. Religions

Bahadur Shah and Jahandar Shah, were incapable rulers, practically under the control of the vizier Zulfikar Khan. The three following were mere names under cover of which Husain Ali, Governor of Bihar, and Abdulla, Governor of Allahabad, controlled affairs.

During the reign of Mahommed Shah the Mahrattas, who had already subdued the Deccan, wrung first Malwa (1743) then Orissa (1751) from the feeble grasp of the Mogul emperor. The same year saw the first inroad of the Afghan prince Ahmed Shah, followed in quick succession by three other invasions, to repel which the assistance of the Mahrattas was obtained. In 1761 the decisive battle of Panipat was

coasts of Malabar, and soon extended their power over nearly all the ports and islands on the coasts of Persia and India. In 1595 the Dutch gained a footing in India.

The English East India Company had formed commercial settlements in India as early as 1613, Surat being the chief station. (*See* EAST INDIA COMPANY.) A grant of a small territory around Madras was received from the Rajah of Bijnagar in 1639, on which was erected the fort of St. George. Madras became a presidency in 1654. Calcutta, ultimately the seat of government in India, was settled in 1690, and became a presidency in 1707. The English early came into collision with the Portuguese and


INDIA
under the Great Moghals
English Miles
0 50 100 200 300 400 500
Boundary of Moghal Empire under Akbar, c.1600
Boundary of Moghal Empire at its greatest extent under Aurangzeb, c.1700
70°
80°
90°
30°
20°
10°
Kabul
KASHMIR
R. Indus
LAHORE
Kandahar
PUNJAB
MULTAN
SIND
Delhi
RAJPUTANA
AJMIR
Agra
Fatehpur Sikri
Lucknow
Jaunpur
R. Ganges
BIHAR
Gwalior
Allahabad
Chitor
MALWA
BENGAL
Ft. William (Br. 1696)
GUJARAT
KHANDESH
BERAR
ORISSA
Bombay (British 1662)
R. Godavari
Golconda
Bijapur
R. Kistna
Masulipatam
Goa (Portuguese)
MYSORE
Madras (British 1639)
CEYLON (Portuguese to 1658) (Dutch after 1658)
Longitude East 80° of Greenwich

Dutch, but it was the struggle with the French in India (their first settlements were founded in 1604) for influence over the native princes, that led step by step to the establishment of the British Empire in India. The first conflict with the French took place in 1746, when the English lost Madras, which was, however, restored by the treaty of Aix-la-Chapelle. In 1751 Dupleix, the French Governor of Pondicherry, was powerful enough to place creatures of his own on the thrones of the Deccan and the Carnatic. The Englishsupportedrivalcandidates, and the result was a second war, which left English influence predominant in the Carnatic, though the French still controlled the Deccan. The most memorable incident in this war was Clive's capture of Arcot.

About this time important events took place in Bengal, then a subordinate presidency to that of Madras. The Nawab of Bengal, Siráj-ud-Daulá (Surajah Dowlah), attacked the English settlement at Calcutta with a large army, forced it to capitulate, and thrust the prisoners, to the number of 146, into the Black Hole or common prison of the garrison, a room 18 feet square, with two small windows. After a night of unparalleled suffering only twenty-three were found alive in the morning. Clive was at once sent with an armed force from Madras, recovered Calcutta, attacked and took the French settlement at Chandernagore, routed the Nawab's army at the battle of Plassey (23rd June, 1757), and placed Mir Jaffier on the vice-regal throne, with consent of the Mogul court. In the south the English were equally victorious. A force dispatched by Clive took Masulipatam, and the victory gained by Coote at Wandewash on 22nd Jan., 1760, completed the destruction of the French power in India.

In Bengal Mir Jaffier soon found himself unable to meet the exorbitant claims of his allies, and in 1760 he was deposed in favour of his son-in-law, Mir Kasim, who agreed to pay the balance due by Mir Maffier as well as grant the districts of Burdwan, Midnapore, and Chittagong to the English. But disputes soon led to a war, in which Mir Kasim was worsted and forced to flee. The British retained the collectorship or fiscal administration of Bengal, Bihar, and Orissa, under the fiction of a grant from the Mogul emperor. A nominal native ruler, however, was still appointed in the shape of a nawab, who received an allowance of £600,000, and the actual collection of the revenues was still left to the native officials.

This system of double government established by Clive was abolished in 1772 by Warren Hastings, who appointed English officers to collect the revenues and preside in the courts, and thus laid the foundations of the present system of British administration in India. In 1774 Hastings was made Governor-General of India. Amongst the notable measures of his vigorous rule were the refusal of the £300,000 of the Bengal tribute to the Mogul emperor, the sale of the provinces of Allahabad and Kora (assigned by Clive to the emperor in 1765) to the Nawab of Oudh, and the loan of British troops to the same nawab for the subjection of the Rohilla Afghans For these and other acts, such as the extortion of heavy fines and forfeitures from the Begum of Oudh and the Rajah of Benares. Hastings was impeached on his return to England. (*See* HASTINGS.)

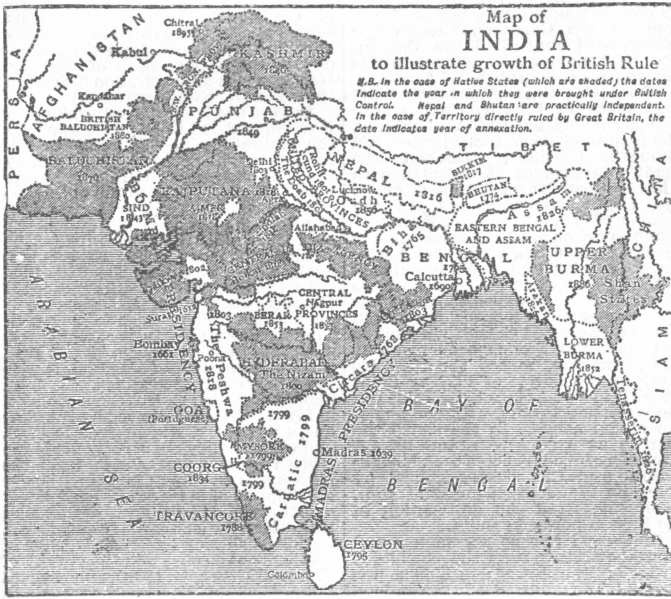
In 1778 the intrigues of the Bombay Government led to the first war with the Mahrattas, in which the British arms were only saved from disgrace by the achievements of the Bengal army which Hastings sent to the aid of the other presidency; and in the war with the Sultan of Mysore the diplomatic skill of Hastings, and the valour of the Bengal troops under Sir Eyre Coote, again won victory for the British.

In 1786 Lord Cornwallis succeeded Hastings as Governor. His rule is memorable chiefly for the war with Tippoo, Sultan of Mysore, which terminated in the Sultan having to surrender one-half of his dominions to the British and their allies. Sir John Shore succeeded as Governor-General in 1793. He was followed by the Marquess Wellesley, who arrived in 1798, and whose policy eventually made the British power paramount from the Himalayas to Cape Comorin. Under him Tippoo of Mysore was completely overthrown (1799) and the second Mahratta war successfully concluded, Arthur Wellesley (afterwards Duke of Wellington) having won the victory of Assaye (23rd Sept., 1803), and General Lake that of Laswaree (1st Nov., 1803).

In 1805 Lord Cornwallis went out as Governor-General for the second time. He died soon after his arrival, and was succeeded by Sir George Barlow, and he by Lord Minto in 1807. In 1809 some disturbances at Travancore and Cochin led to these regions being placed under British control. During the governorship of the Earl of Moira (Marquess of Hastings, 1814–23) there was a war with the Gurkhas of Nepal, which after a short struggle ended with the cession to the British of Kumáon; and another with the three great Mahratta princes, the Peshwá of Poona, the Rajah of Nágpur, and Holkar of

Indore. The Peshwá's territory was annexed; the other Mahratta princes were compelled to accept alliances placing them under British protection. A new province, the nucleus of what are now the Central Provinces, was formed out of territory recovered from the Pindáris.

In 1823 Lord Amherst succeeded as Governor-General. During his administration the first Burmese War arose, and was concluded in 1826 by the cession to the British of the provinces of Aracan and Tenasserim. Under Lord William Bentinck's rule



(1828–35) administrative reform and the moral elevation of the peoples of India were chief subjects of consideration. In 1836 Lord Auckland assumed the governorship. Two years later the Afghan War broke out, and terminated in the disastrous British retreat. (*See* AFGHANISTAN). During Lord Ellenborough's administration Sind was annexed. Sir Henry (afterwards Lord) Hardinge succeeded in 1844, and the year following the Sikhs, originally a religious sect who had conquered the Punjab, crossed the Sutlej in great force. Four hotly-contested battles, at Mudki, Firozshah Aliwál, and Sobráon, left the British masters of the field. Part of the Sikh territory was annexed, and the infant Dhuleep Singh recognized as rajah of the rest.

In the governor-generalship of the Marquess of Dalhousie (1848–56), a new war broke out with the Sikhs, and after their final defeat by General Gough at Gujerat, 21st Feb., 1849, the Punjab was annexed to the British dominions. This was immediately followed by the second Burmese War, ending in the annexation of Pegu, 20th June, 1853. The Indian states of Sattara, Jhansi, and Nágpur were, on the failure of the native succession, annexed to the British possessions (1852–6), and Oudh also brought directly under British rule. During the same administration the extensive scheme of Indian railways and telegraphs and steamship connection with Europe via the Red Sea was planned and inaugurated. the Ganges Canal opened, and the Punjab Canal begun.

The administration of Viscount Canning (1856–61) was distinguished by a short war with Persia, and especially by the great sepoy mutiny. Several outbreaks among the native soldiers took place during March, 1857. The first formidable revolt, however, was at Meerut on 10th May, where the sepoys of the 3rd Light Cavalry, as-

sisted by the 11th and 20th Regiments of infantry, rose and massacred the Europeans. They then fled to Delhi, where they were immediately joined by the native garrison. Here another massacre took place, and the dethroned descendant of the Moguls once more assumed the sovereignty.

The revolt spread rapidly through the North-Western Provinces and Oudh, down into Lower Bengal. Only in the Punjab the prompt measures of the governing officials in disarming the sepoys prevented an outbreak, and the Sikh population continued steadily loyal. Wherever the mutiny broke out it was attended with savage excesses; women were outraged, and Europeans without distinction of age or sex barbarously murdered. At Cawnpore the revolted sepoys were headed by Nana Sahib, the heir of the last Peshwá of the Mahrattas. After a heroic but fruitless attempt to defend themselves, the Europeans capitulated on the sworn promise of Nana Sahib to allow them to retire to Allahabad. On the 27th the survivors, about 450 in number, were embarking when they were attacked by the Nana's troops, and the men indiscriminately massacred. The women and children, 125 in number, were carried back to Cawnpore and kept till the 15th of July, when they were all cut to pieces on the approach of Havelock's army. Cawnpore was stormed the day following.

At Lucknow Sir Henry Lawrence had the foresight to fortify and provision the Residency, where the garrison held out till relieved by Havelock and Outram on 25th Sept. But Havelock was in turn besieged, and was with difficulty relieved (17th Nov.) by Sir Colin Campbell, afterwards Lord Clyde. Delhi, meanwhile, had fallen, chiefly owing to the skill and valour of Sir John Lawrence. By May, 1858, when Bareilly was taken, Sir Colin Campbell and Sir Hugh Rose had restored order, and the mutiny was at an end.

In 1858 the direct sovereignty of India, and the powers of government hitherto vested in the East India Company, were vested in the British Crown. Lord Canning returned to England early in 1862, and was succeeded by the Earl of Elgin, who died in 1863. Sir John (afterwards Lord) Lawrence was Governor-General from 1863 to 1868, when he was succeeded by the Earl of Mayo. He was assassinated by a Mahommedan fanatic in the Andaman Islands, and Lord Northbrook became Viceroy in 1872.

In 1876 Lord Lytton was appointed Viceroy, and on 1st Jan., 1877, Queen Victoria was proclaimed Empress of India at Delhi In 1880 Lord Ripon became Viceroy, being followed in 1884 by Lord Dufferin, under whom Upper Burma was annexed, 1st Jan., 1886. He was followed by the Marquess of Lansdowne, the Earl of Elgin, and Marquess Curzon. Under him were formed the North-West Frontier Province and that of Eastern Bengal and Assam, and the expedition into Tibet took place. In 1905 the Earl of Minto became Viceroy. Native Hindus were now appointed to the Council of the Secretary of State and to the Council of the Viceroy, and the Indian legislative councils were reorganized. Lord Minto was succeeded in 1910 by Lord Hardinge of Penshurst. In 1911 King George V visited India. Delhi became the capital instead of Calcutta.

When the European War broke out, India generously and enthusiastically supported Great Britain with troops and money. Even loyal Indians, however, were of opinion that in view of India's loyalty and ungrudging support the country deserved a better treatment and should no longer be considered as a mere dependency. Extremists, on the other hand, were stirring up hatred and revolution, and clamoured for absolute independence and self-government. Lord Chelmsford succeeded Lord Hardinge as Viceroy in 1916. In 1919 the Government of India Act was passed, and the existing system of administration was introduced. In April, 1919, disturbances broke out in Ahmadabad and the Punjab, and although they were rigorously put down, dissatisfaction continued. The Ameer of Afghanistan tried to invade India in May, 1919, but his armies were defeated. In 1921 the Earl of Reading was appointed Viceroy, and left for India in March. During the winter of 1921–2 the Prince of Wales visited India. Mr. E. F. L. Wood (afterwards Lord Irwin) was Viceroy from 1926 to 1931, when he was succeeded by Lord Willingdon.

In 1927 a Royal Commission (chairman, Sir John Simon) was appointed to investigate constitutional reform. This Commission presented its report in 1930, but its constructive recommendations raised a storm of protest in Indian political circles; the non-co-operation movement acquired a new activity, and Mr. Gandhi's campaign of civil disobedience became more acute. The British Government (advised by Lord Irwin) then decided to hold a free conference (the Round Table Conference) between representatives of British India, the Indian States, and the British Government. Indian fears having been allayed by the Viceroy's assurance that the conference would be free to approach its task of deciding the consti-

tutional future of India assisted, but unhampered, by the Simon Commission Report, a truly representative conference was opened in London by the King-Emperor in Nov., 1930. This conference, working in committees, continued to sit till Jan., 1931. A second session was held between Sept., 1931 and Jan., 1932.

This Round Table Conference decided upon a federal organization for India, and during 1932 various committees proceeded to India to investigate problems affecting federation, and a committee in London (chairman, Lord Sankey) proceeded to draft a federal constitution. The main difficulty was the Communal Question—the problem of the representation of the minority communities. As the Indians themselves could not agree

Insignia of the Order of the Star of India

about this, the British Government, in 1932, adjudicated in the matter and issued a final settlement. A smaller conference met in London in Nov., 1932. The Government proposals for constitutional reform were issued in a White Paper in March, 1933.—

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INDIA, ORDERS OF KNIGHTHOOD IN, consist of *The Most Exalted Order of the Star of India*, instituted in 1861, and comprising the Viceroy of India as Grand Master, and a number of Knights Grand Commanders (G.C.S.I.), Knights Commanders (K.C.S.I.), and Companions (C.S.I.); *The Most Eminent Order of the Indian Empire*, instituted 1st Jan., 1878, and comprising the Viceroy of India as Grand Master, a number of Knights Grand Commanders (G.C.I.E.), Knights Commanders (K.C.I.E.), and Companions (C.I.E.), The constitution of this Order was revised in 1911. *The Imperial Order of the Crown of India* was instituted 1st Jan., 1878, its members comprising the Princess of Wales and the princesses of the blood-royal, and other British and Indian ladies.

INDIA MATTING, a matting woven from the stems of *Papyrus Pangorei* or *corymbosus*, and chiefly exported from Bengal. Variety is obtained by colouring-matters either on the stems themselves or as a pattern printed on the surface of the mat.

INDIAN'A, one of the United States, bounded by Michigan lake and state, Ohio, Kentucky, and Illinois. It is almost one continuous plain, with the exception of the hills of the Ohio River and Wabash valleys, which rise from 200 to 600 feet above the sea-level. The western side of the state, north of the Wabash, is mostly prairie land interspersed with lakes, woodlands, and swamps. The eastern part was originally thickly covered with forests, which, however, are rapidly disappearing before the settler.

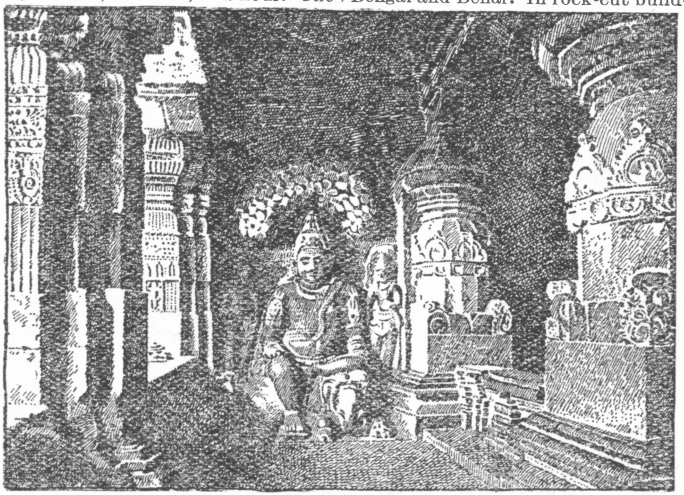
Indian corn, wheat, oats, barley, tobacco, and potatoes are the chief agricultural products. Molasses, cider, wine, honey, cheese, and milk are also plentifully produced. Immense herds of cattle and swine are reared. The coal-fields of the state have an area of 6,500 sq. miles, with coal of excellent quality, and an output which amounted to 13,310,000 short tons in 1931. Woollens, cottons, lumber, agricultural implements, manufactures of iron, paper, and leather are leading industries.

The Ohio, White River, Wabash, and the Miami are the principal rivers. A canal 467 miles in length, from Evansville to Toledo, unites the Ohio, the Wabash, and Lake Erie. There were in 1931, 8,626 miles of steam railway, and 1,988 miles of electric railway. The principal towns are Indianapolis (the capital), Evansville, Gary, Fort Wayne, Terre-Haute, East Chicago, Hammond, South Bend, Muncie, &c. Among the many institutions for higher education are Indiana University (Bloomington), De Pauw University (Greencastle), Purdue University (Lafayette), and the University of Notre Dame.

Indiana was part of the territory ceded by the French to the British in 1763, and by the British to the United States in 1783. It was erected

into a state in 1816, and sends two senators and twelve representatives to Congress. Pop. in 1910, 2,700,876; 1930, 3,238,503. Area, 36,354 sq. miles.

INDIANAP'OLIS, a city of the United States, capital of Indiana, on the White River, near the centre of the state, mostly situated on a plain. It is the centre of numerous railroads, and, being surrounded by rich agricultural and mineral regions, is a place of great trade and manufactures. It is an important market for grain, live stock, and timber, and carries on pork-packing, the production of iron goods of various kinds, agricultural implements, woollens, and flour. The city is built in the usual transatlantic style, the chief building being the state house. Educational and benevolent institutions are numerous, the former including a university, medical and other colleges. Pop. (1930), 364,161.



Rock-cut Temple at Ellora, Buddhist style

INDIAN ARCHITECTURE comprehends a great variety of styles, among which we may distinguish, as the most important, the Buddhist style, the Jaina style, the Dravidian or style of Southern India, the Chalukyan style, and the Modern Hindu or Indian-Saracenic style.

Buddhist. The history of Indian architecture commences in the third century B.C. with the religious buildings and monuments of the Buddhists. Amongst the principal forms of *Buddhist architecture* are the following: First, the *topes, stupas,* or towers built to mark some sacred spot, and the *dagobas,* constructions of a similar nature, containing relics of Buddha or Buddhist saints. These buildings generally consisted of a circular stone basement, varying from 10 or 12 to 40 feet in height, and from 40 to 120 feet in diameter, on which rose a rounded domical structure, generally of brick or small stones laid in mud, the whole edifice rising sometimes 50, sometimes 100 feet high. (*See* DAGOBA; TOPE.) Second, the rock-cut *chaitya halls* or churches, and the *viharas* or monasteries. Most of these are found in the Bombay Presidency; some also in Bengal and Behar. In rock-cut buildings architectural skill is confined to the façade and the interior, which are generally cut out with most beautiful and perfect detail. Amongst the most notable for beauty of design are those at Ajanta, and, finest and largest of all, the great Chaitya cave at Karli, near Bombay, the date of which is probably about 80 B.C. Another interesting example is at Ellora.

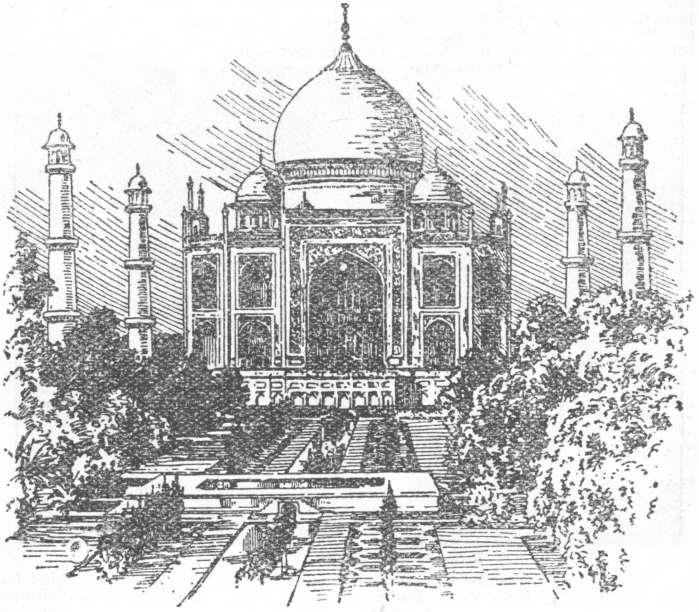
Jaina. The *Jaina style* is a development or corruption of the pure Buddhist. It is characterized by the square or polygonal court, the twelve-pillared dome, the slenderness and elegance of the columns, the horizontal arch, the *sikras* or towers surmounting the cells containing the images, and, lastly, by the peculiar grouping of many temples together on hill-tops. Prominent examples of

Jaina architecture are found at Girnar in Gujerat; and at Mount Abu of the Aravulli range.

Dravidian. The *Dravidian style* is that of the peoples of Southern India. Its most flourishing epoch comprises the sixteenth, seventeenth, and even eighteenth centuries of our era. To this late period belong the great temples at Tanjore and Tiruvalur. The distinctive parts of a Dravidian temple are the *vimana* or temple proper, with storied pyramidal roof; the *mantapas* or porches, covering the door which leads to the cell; the *gopuras* or gate-pyramids, in the quadrangular enclosures surrounding the vimanas; the *choultries* or pillared halls, used for various purposes. The general characteristics of a Dravidian temple of the first class are the storied pyramidal towers, the hall of 1,000 columns, the bold cornice with double flexure, the detached shafts, the richly carved stylobate, and the large tanks with flights of stone steps.

Chalukyan. The *Chalukyan style*, so named from a dynasty which rose in the sixth century, in what is now Mysore and the Nizam's Territory, reached its perfection in Mysore from the eleventh to fourteenth centuries. The characteristic features are the open porch, the straight-lined, conical-shaped tower, the star-shaped temple, and the basement terrace of stone.

Indian-Saracenic. The *Indian-Saracenic style* is a general name for a number of somewhat varying styles, the result of the mixture of Saracenic principles of architecture, brought with them by the Mahommedan conquerors of India, and the distinctive architectural features of the different localities where they settled. Under the Mogul emperors in the sixteenth century some most magnificent buildings were erected, such as the tomb of Humayan Shah at Old Delhi; that of Akbar at Secundra (*see* AKBAR); the palaces of Shah Jehan at Agra and Delhi; and the Taj Mahal, built by the same monarch at Agra. The Moslem architecture of India contrasts with the native Indian styles in its use of the radiating arch, in the superior simplicity and grandeur of its style—its flat ornamentation not interfering with the lines of true architectural construction. A characteristic feature also is its fine



The Taj Mahal, Agra

conventionalism of vegetable forms for decoration and tracery. *See* SARACENIC ARCHITECTURE.—BIBLIOGRAPHY: J. Fergusson, *History of Indian and Eastern Architecture*; G. Le Bon, *Les Monuments de l' Inde*; E. B. Havell, *Handbook of Indian Arts*; *Ideals of Indian Art*.

INDIAN CIVIL SERVICE. The Indian Civil Service offers opportunities to any man who is not afraid of responsibility and who possesses initiative. It is a service with great traditions, and Britain will continue to require in India the type of man who, in respect both of character and intellect, will maintain those principles of equity and wise moderation in government for which Indian civil servants have long been renowned.

It is now the policy to employ a considerably larger proportion of Indians in the service than was formerly the case. Competition among European candidates, therefore, will be more severe. Candidates must satisfy the Civil Service Commissioners that they are British subjects, that they are in good health, and of good moral character. The competition for places is held annually on 1st Aug. and following days of each year. The necessary forms of application must be in the hands of the Commissioners by the third week of June in each year. The age limits are twenty-one and twenty-four.

The examinations, for which a fee of £8 is charged, are held in London. They aim at discovering in the candidate not merely specialized knowledge along one line of study, but the standard of his general culture. All candidates are required to take an English essay, general questions in the use of English, papers on contemporary subjects, social, economic, and political. A paper is set on matters relating to the general principles and methods of service, and candidates are required to translate from a modern language, or, in special cases, from Latin. In this part of the examination there is a viva-voce test, which carries no fewer than 300 marks out of the 800 which forms the maximum for this part of the examination. In the second part of the examination, which carries a maximum of 1,000 marks, candidates are given a very wide choice. Here intensive study of languages, or history, or economics, or mathematics and science is essential. No one need attempt the examination whose standard of knowledge is not equivalent to that demanded for the Honours Degrees of British universities.

The successful candidate, before proceeding to India, undergoes a two-years' probation in this country, generally at the Universities of Oxford or Cambridge. During this period he is paid an annual sum by the Government, amply sufficient to maintain him in residence. At the end of that period he must pass a final examination in one Indian language together with tests on the Indian Penal Code, Code of Criminal Procedure, the Indian Evidence Act, and Indian history. He must also pass a riding test.

The pay of an Indian civil servant begins at 600 rupees a month. By the eleventh year of service he has risen to 1,600 rupees per month, and at this point he must pass an 'efficiency' test. At the twenty-fifth year of service the pay is 2,500 rupees a month, when the civil servant is eligible to retire on a pension of £1,000 per annum. A deduction of 4 per cent of salary made throughout his service is separately funded and returned to him on his retirement, or paid to his heirs in case of death.

The pecuniary advantages are very considerable. But they are of small account when compared with the powers and responsibilities given by such an appointment; and nowhere in the world can one find a field so rich as India in opportunities for administrative ability and genuine leadership.

Full particulars of the examination can be obtained from the Civil Service Commission, Burlington Gardens, London, W.1.

INDIAN FIG, a name given to the *Opuntia Tuna* and *O. ficus-indica*, and other species of the Cactus family common in the tropical and subtropical countries of America, and now naturalized in Africa, Asia, and Southern Europe. They are generally from 10 to 12 feet high. Their fruit, which is egg-shaped and from 2 to 3 inches long, is cooling and wholesome, and yields a juice used for colouring confectionery. The wood of the stems becomes very hard with age.

INDIAN INK. *See* INKS

INDIAN MUTINY. *See* INDIA (HISTORY).

INDIAN OCEAN, that great body of water which has Asia on the north, the Sunda Isles and Australia on the east, Africa on the west, and the Antarctic Ocean on the south. The Cape of Good Hope and the southern extremity of Tasmania may be considered its extreme southern limits on the west and east. Its length from north to south somewhat exceeds 6,500 miles; its breadth varies from 4,000 to 6,000 miles. It is traversed by the equatorial current flowing east to west, and its navigation by sailing

vessels is more or less modified by the periodic trade-winds and monsoons. Its greatest known depth is 3,393 fathoms. Its chief arms are the Bay of Bengal on the east of India, and the Arabian Sea on the west, extensions of the latter being the Persian Gulf and Red Sea. Madagascar, Ceylon, and Mauritius are among the islands.

INDIANS, AMERICAN, the collective name given to the tribes inhabiting the continent at the time of the discovery by Columbus, and to such of their descendants as still survive. The name of Indians was first given to these races from the notion that the newly discovered continent formed part of India.

The Esquimaux or Innuit, the most northerly of the American tribes, are not usually classed among the Indians. Next below them are the allied Kenai and Athabascan groups, the former represented chiefly by the Yellow Knife or Atna tribe on the Yukon River. The Athabascans are chiefly found between Hudson Bay and the Rocky Mountains, but include besides the Chippeways, Coppermine, Dogrib, and Beaver Indians; the Tlatskanai, Unkwa, and Hoopah Indians of the Oregon coast; the Navaho tribe of the Highlands of New Mexico; the Apaches, ranging from the western Colorado to Chihuahua and Coahuila; and the Lipani, north of the mouth of the Rio Grande del Norte.

Canada and the United States east of the Mississippi were formerly inhabited by the Algonquin-Lenappe and the Iroquois, generally at war with each other. The extreme west of the Algonquin region was occupied by the Blackfeet Indians; the Ojibeways held the shores of Lake Superior; south and west of Hudson Bay were the Crees. The Leni-Lenappe section of the Algonquin-Lenappe group comprised the five nations of the Delawares, including the Mohicans. The Iroquois included the Senecas, Cayugas, Onondagas, Oneidas, and Mohawks, who formed a league of five nations, afterwards joined by the Tuscaroras. The Hurons were of the Iroquois group.

The Dacotah or Sioux group occupied the plains between the Rocky Mountains and the Mississippi as far south as Arkansas, and included the Assiniboias, Winnipegs, Iowas, Omahas, Osages, Kansas, Arkansas, Menitarees, Crows, and Mandans. West of the Mississippi also were the Pawnees and Riccaras about the Nebraska or Platte River, and to the south-east were the Choctaws and Chickasaws.

In the Rocky Mountain regions were the Shoshone or Snake Indians, including the Comanches and others. The Cherokee tribes, which inhabited South and North Carolina, formed a detached group, and the Texas Indians were comprised in many small and diverse tribes.

Below these, in New Mexico, a more advanced and distinct family is found called Moquis or Pueblo Indians. Of the numerous families occupying Mexico the Nahuatls or Aztecs were the most powerful and the inheritors of the high civilization of the Mayas. The Otomis, speaking a peculiar language, were also a numerous people in Mexico.

In Central America the predominating family was the Maya, including the Quichés and Kachiquels. The ancient Maya people were the most highly civilized in Central America, probably because about twenty centuries ago the germs of the ancient civilization of South-Eastern Asia were planted in Honduras and the neighbourhood. Portions of the Aztec tribes were also found in Central America.

In South America the leading and more advanced families were those that made up the Peruvian Empire among which the Inca race and the Aymaras were the chief. The Araucanians, to the south of these, in Chile had a considerable resemblance to the Algonquins and Iroquois of North America. The remaining portions of the continent, including the great alluvial tracts of the Atlantic slope were principally occupied by the Guaranis; but along its northern coast were found the Caribs, who spread also over the Antilles and most of the West Indian Islands. In the extreme southern part of the continent live the tall Patagonians or Tehuelche and squalid families in some respects resembling the more debased Australians.

The American Indians were originally derived from a protomongolian stock in North-Eastern Asia, which made its way into America by Behring Strait. Before they left Asia these people had already become mingled with other Asiatic races; and for many centuries afterwards (and especially between 300 B.C. and A.D. 700) there were repeated accessions of small groups of aliens from the eastern shores of Asia and Polynesia to the Pacific littoral of America, and especially to Central America and Peru. They are generally characterized as having long, black, and straight hair, scanty beard, heavy brows, receding forehead, dull and sleepy eyes, a salient and dilated nose, full and compressed lips, and the face broad across the cheeks, which are prominent but less angular than in the Mon-

golian. The facial angle is about 75° (about 5° less than the European average); the hands and feet are small and well proportioned. The complexion varies from dark-brown to almost white; a somewhat reddish tint is common.

The North American Indian is described as of haughty demeanour, taciturn and stoical; cunning, brave, and often ferocious in war; his temperament poetic and imaginative, and his simple eloquence of great dignity and beauty. The Aztecs in Mexico worshipped the sun with human sacrifices and the grossest rites.

The peoples of the United States and Canada believe in the two antagonistic principles of good and evil, and have a general belief in manitous, or spiritual beings, one of them being spoken of as the *Gitche Manitou*, or Great Spirit. They believe in the transmigration of the soul into other men and into animals, and in demons, witchcraft, and magic. They believe in life after death, where the spirit is surrounded with the pleasures of the 'happy hunting-grounds,' though they have no idea that the acts of their present life can have any connection with their future happiness.

They adopt a *totem* or symbol of the name of the progenitor of the family; this is generally some animal (the turtle, bear, and wolf being favourites), which is the mark of families even when expanded into tribes. (*See* TOTEMISM.) No marriage rite is necessary beyond the consent of the parties and their parents; but the wife may be dismissed for trifling causes, and polygamy is allowed. In ancient times the body was covered with furs and skins according to the seasons, but now the white man's clothes and blanket have generally superseded the native dress; though the moccasin of deer or moose hide, and in the wilder tribes the ornamental leggings and head-dresses, are largely retained.

Their dwellings are made of bark, skins, and mattings of their own making, stretched on poles fixed in the ground. Their arms consist of the bow and arrow, the spear, tomahawk, and club, to which have been added the gun and knife of the whites. Canoes are made of logs hollowed out, or of birch bark stretched over a light frame, skilfully fastened with deer's sinews, and rendered water-tight by pitch.

The antiquities found in Mexico and Peru, and the ruins of elaborate buildings in Central America, prove that the semi-civilized races there existing had adopted from the Old World (*c.* A.D. 300) high ideals of sculpture and architecture, but these arts, like the rest of their borrowed culture, rapidly deteriorated, and twelve centuries later, when the Spaniards arrived, their civilization was approaching its dissolution. The number of Indians in the British possessions is about 103,800, in the United States about 332,397, in Central America 2,000,000, and in Mexico 4,620,880, in all North America somewhere about 6,000,000.

In South America their number is probably about 6,500,000, many of them being more or less civilized and professing Christianity. In this article it has not been possible to indicate the wide range of variations in physical type and in the customs and beliefs of the different groups of Indians. For such information *see* Clark Wissler, *The American Indian*.

INDIAN TERRITORY, a tract of country in the United States allotted for the residence of certain of the Indian tribes who were partly removed from the south-east states of the Union. It was bounded mainly by Kansas, Texas, Oklahoma, and Arkansas, the southern boundary being formed by the Red River; area, 31,400 sq. miles. The chief rivers are the Arkansas and its tributaries (Canadian River, Neosho, &c.) and the Red River and its tributaries. The greater portion is fertile, and suited for stock-rearing.

The Indian tribes or 'nations' among which this territory was apportioned were the Cherokees, Creeks, Seminoles, Choctaws, and Chickasaws, all of whom have made considerable advances in civilization, having schools, churches, newspapers, &c. The white inhabitants have immensely increased since the opening of coal-mines, the construction of railways, &c. Cultivation is rapidly extending.

The Indian Territory was reduced to about half in 1889 and subsequently, by the loss of Oklahoma, but on 16th June, 1906, a Bill was passed by which it was again united with Oklahoma (an area of 31,400 sq. miles) to form a state so called, the population having immensely increased. The population of Oklahoma state in 1930 was 2,396,040, including 92,725 Indians.

INDIAN YELLOW, or **PURREE**, a pigment used in India for colouring wood-work and by artists for water-colour. It has a disagreeable odour, and the colour is not permanent, and therefore not much used as a dye. Analysis shows the chief organic ingredient to be euxanthic acid ($C_{19}H_{18}O_{11}$), along with silicates of alumina, lime, and magnesia, water, and volatile matter.

INDIA OFFICE, an important Government department created in 1858, when, largely as a result of the disastrous Indian Mutiny, which took place in the previous year, the control of British India passed from the hands of the East India Company to those of the Crown. Since that date the direct government of India has been vested in a resident Viceroy and Governor-General, an office which Lord Canning was the first to hold. The Viceroy, appointed for five years, is assisted by an Executive Council composed of six ordinary members appointed by the Crown, with the addition of an extraordinary member in the person of the commander-in-chief of the army in India.

This Executive Council has the functions of a Cabinet, and its members also sit as part of a Legislative Council, other members of which (from six to twelve in number) are appointed by the Viceroy. This high official is, in his turn, answerable to the Secretary of State for India, who, always a member of the British Cabinet, is at the head of the India Office. He is assisted by a Council the members of which vary in number from ten to fifteen; by permanent, parliamentary, and other under-secretaries; by an accountant-general, a Government director of Indian railway companies, and an extensive departmental staff. In 1920 was created, in accordance with an Act passed in the previous year, the new office of High Commissioner for India. Subject to the direction and control of the Governor-General in Council, the duties of High Commissioner are to act as Agent in the United Kingdom on behalf of Local Governments in India for such persons as the Governor-General in Council shall prescribe; and, further, to conduct any business relating to the Government of India which, hitherto conducted by the India Office, may be assigned to him by the Secretary of State.

The India Office is at Whitehall, London, S.W. The Secretaryship of State for India, with a salary of £5,000 a year, is at present (1933) held by Sir Samuel Hoare, Bt., G.B.E. The annual salary of the High Commissioner for India is £3,000; the post is at present (1933) held by Sir B. N. Mitra, K.C.S.I., K.C.I.E.

INDIA-RUBBER. *See* RUBBER.

INDICATOR, in chemistry, the name given to the third substance which is added to a mixture of two others, in order to tell when the reaction between the two latter is complete. The indicator usually acts by exhibiting some characteristic colour change. When dilute caustic soda solution is added to dilute sulphuric acid, it is difficult to tell the exact point at which all the acid is neutralized, but if a few drops of an indicator, such as litmus, are added, the point of neutralization is readily determined, since the litmus gives a red colour with the acid, but immediately this is neutralized the colour changes to blue.

INDICATOR. *See* HONEY-GUIDES.

INDICTION, in chronology, a period or cycle of fifteen years, supposed to relate to some judicial acts, probably the publication of tariffs of the taxes which took place at stated intervals under the Greek emperors. Three sorts of indiction are mentioned (1) the Cæsarean, which fell on the 8th of the calends of October, or 24th of September; (2) the indiction of Constantinople (beginning A.D. 312), on the 1st of September; and (3) the pontifical or Roman, which begins on the calends of January. We find ancient charters in England dated by indictions.

INDICTMENT (in-dīt'ment), in law, a written accusation of one or more persons for a crime or misdemeanour, preferred to and presented upon oath by a grand-jury to a court. In Scotland the indictment is addressed to the prisoner directly by name. Indictments had formerly to be written on parchment, and all minute particulars of the offence specified. By the Indictments Act of Oct., 1915, indictments could be written on paper, and they were also made less formal.

INDIGIRKA, a river of Eastern Siberia, flowing northwards into the Arctic Ocean, length, 750 miles.

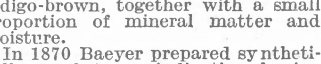
IN'DIGO has long been extensively employed in dyeing and calico-printing on account of the quality and fastness of the colour obtained from it. It is present in the woad plant, *Isatis tinctoria,* which is still cultivated to a certain extent in England. It is also largely prepared from various leguminous plants of the genus Indigofera, herbaceous or shrubby plants with pinnate leaves and small pea-shaped flowers disposed in axillary racemes, which occur in India and other tropical countries. *Indigofera tinctoria* is the species most abundantly cultivated. The plant is of a perennial nature, but is usually reared from seed sown twice each year.

The indigo is present mainly in the leaves in the form of a complex glucoside indican, from which it is obtained in the free state by a process of fermentation. The cut plant is steeped in vats for about twelve hours, and the fermented extract, which is of a yellowish-green colour, run off into

fresh vats and agitated with air. The liquid turns green and finally blue with deposition of the indigo in the form of a mud. This is boiled up with water, allowed to settle, pressed and cut into cubes which are dried and sent into the market.

Thus obtained, indigo forms dark-blue to purplish-violet lumps which show a bronzy lustre when rubbed. In addition to the essential constituent indigo-blue, which is present to the extent of about 60 per cent, natural indigo contains indigo-red and indigo-brown, together with a small proportion of mineral matter and moisture.

In 1870 Baeyer prepared synthetically a substance, indigotine, having the formula:



which is identical with indigo-blue. Since then many processes have been devised by which artificial indigo is manufactured on a commercial scale. As a result, the export of natural indigo from India has fallen very considerably, and at present about 90 per cent of the world's supply is obtained from artificial sources.

Originally the greater part of the synthetic supply was manufactured by the Heumann synthesis, in which naphthalene is used as the starting point, but, owing to the great rise in the price of this material it has been largely superseded by another process depending on the use of aniline, chloracetic acid, and sodamide.

Indigotine is insoluble in all the ordinary solvents; it has no affinity for fabrics of an animal or vegetable nature, and can only be fixed on them by a process known as vat-dyeing. The indigo is first reduced to indigo-white, which is dissolved in an alkaline liquid to form a colourless solution known as the indigo vat. The material to be dyed is immersed in the vat and wrung out, the indigo-white absorbed being readily oxidized by the air to indigo-blue, which is insoluble, and thus cannot be removed from the fibre by washing. On treatment with fuming sulphuric acid, indigo dissolves to form indigo sulphonic acid, the sodium salt of which, known as indigo carmine or indigotine, is largely used in dyeing and ink manufacture.

IN'DIUM, a metal discovered by Reich and Richter in 1863 by means of spectroscopic analysis in the zinc-blende of Freiberg. It has a silver-white colour, is soft, and marks paper like lead; specific gravity, 7·42; melting-point, 155° C. The metal is related to aluminium, and its spectrum exhibits two characteristic lines, one indigo and another blue. Salts of indium colour the Bunsen gas-flame dark blue. Its chemical symbol is In, atomic weight 114·8.

INDIVIDUALISM is the doctrine which places the individual unit above the whole constituted by the separate units. It is a collection of theories based upon the principle of individuality and according to which the individual is an end in himself, all social forms, such as family, association, state, religion, law, morality, and customs, being only a means for the development of the individual. They are created by him and for himself, and are kept up or modified by him in his own interest.

In philosophy (metaphysics) individualism is the theory which, in the physical as in the spiritual world, grants only to individuals or self-determined units (monads, or atoms) an independent existence, considering the whole merely as an aggregate of so many units or individuals.

Opposed to this theory is the doctrine of *universalism*, which maintains that only the universe as a whole has a substantial existence, whilst the units constituting the whole are mere modifications, fleeting waves in the vast ocean of universality. Thus Protagoras, who said that man is the measure of all things, the Atomists, Leibnitz, and others were all individualists, whilst the monistic systems, or the doctrines which see in the universe a manifestation of a simple principle, are opposed to metaphysical individualism. Opposed to it is also the system of pantheism, which admits only of one universal reality, one substance, namely God.

In ethics, or morality, individualism is the tendency to look upon the individual as an end in himself, to consider social life as of no importance as compared to the life of the individual, and to subordinate the good and welfare and happiness of society to those of the individual. This, however, does not necessarily imply absolute selfishness or egoism.

Moral individualism is not always synonymous with egoism, although extreme moral individualism involves selfishness. 'The greatest happiness of the greatest number' is a doctrine to which the individualist, too, may subscribe, but to him the greatest number consists of separate, independent units. In aiming at the happiness of the greatest number, the individual welfare of the separate units has to be taken into consideration. Moral individualism means, in other words, that the interests of the individual must not at any moment be sacrificed in the interests of the collectivity,

since this collectivity, being an aggregate of individuals, loses its *raison d'être* once the rights of the single individual are ignored.

Moral individualism involves a criticism of existing ethics, of national customs, and of traditions. It maintains that since moral obligation is born in the individual conscience, 'a man's ideals are the measure of his morality.'

This tendency or doctrine of moral individualism has been expressed by philosophers of all ages, by the Sophists, the Cynics, the Stoics, the Epicureans, Plotinus, Leibnitz, and Wolf. It has passed through many phases, from the moral individualism of Socrates to that of the Renaissance, which represented the growth and development of individualism and the emancipation of the individual from ecclesiastical bondage; from Kant's moral to Nietzsche's non-moral individualism; and from the individualism of Abélard to that of Max Stirner. Altogether it may be pointed out, *en passant*, that the philosophy and the literature of the second half of the eighteenth and of the first half of the nineteenth centuries were favourable to moral individualism.

Politically and economically individualism is the antithesis of collectivism. It is the system which considers the State as the mere guardian of the rights of the individual, and even as a means calculated to serve individual ends. Political individualism does not always oppose sovereignty of government. We have an example in the teaching of Hobbes, who, in spite of his individualism, was a supporter of government and even of despotism.

Whilst moral individualism teaches that social life is of no importance as compared to that of the individual, political individualism advocates individual liberty, but only as far as it is compatible with the freedom of others and the welfare of the State. Assuming Man to be bad from the beginning, and to require a restraint for his selfish tendencies, many individualists admit the usefulness of government as a necessary evil. But just as extreme moral individualism leads to selfishness, extreme political individualism culminates in anarchism, which rebels against restraints imposed by the State upon the freedom of action of the individual, and repudiates the right of society to impose any such restraints.

Economically individualism advocates economic freedom, individual initiative, and the non-interference of the State in the economic machinery, production, distribution, or consumption. It demands the absolute freedom of the individual to sell and buy labour as dearly or as cheaply as the economic market would allow him. Free play to individual energy, ample scope given to the individual citizen freely to pursue his enlightened interest, and free competition will necessarily result—so the economic individualists maintain—not only in the survival of the economically fittest, but in the happiness of the greatest number and the welfare of the State. Economic individualism is thus opposed to socialism, to State legislation, and minimum wage.

The doctrine was developed during the eighteenth century and was expressed in the famous formula of *laissez faire* (q.v.). as taught by the Manchester school, a doctrine involving the minimization of State interference. Economic individualism was derived from the political philosophy of the eighteenth century, and its exponents were Adam Smith (*Wealth of Nations*), Bentham, Ricardo, and the elder Mill, who derived his views from Adam Smith, and notably Herbert Spencer (*The Man versus the State*) in this country, and Bastiat in France. They opposed not only public enterprises, State railways, telegraphs, and so on, but also restrictive legislation, such as factory laws, and laws regulating the hours of labour for women and children.

A reaction, however, has set in since the end of the nineteenth century, since the progress of socialism and the development of democratic principles.—BIBLIOGRAPHY: Adam Smith, *Wealth of Nations*; H. Spencer, *The Man versus the State*; W. Fite, *Individualism*; W. Donisthorpe, *Individualism: a System of Politics*.

INDO-CHINA, FRENCH. *See* ANNAM, CAMBODIA, COCHIN-CHINA, LAOS TONGKING.

INDO-GERMANIC LANGUAGES, alternatively, **INDO-EUROPEAN,** the most important of the great families into which human speech has been divided, spoken by various peoples in Asia and Europe. The chief branches of this family are the Teutonic or Germanic, including English, German, Dutch, Danish, Swedish, Icelandic and the extinct Gothic; the Slavonic (Polish, Russian, Bohemian); the Lithuanian; the Celtic (Welsh, Irish Gaelic, Breton); the Latin or Italic and the Romance tongues descended from it (French, Italian, Spanish, Portuguese); the Greek, the Armenian, the Persian, and the Sanskrit.

All these tongues are regarded as being descended from a common ancestral tongue or parent speech spoken at some remote period in Central Asia, whence the ancestors of the modern people speaking these tongues

spread into India, Western Asia, and Europe. The term Indo-European is no longer used, except by Italian and French scholars.—BIBLIOGRAPHY: W. Z. Ripley, *The Races of Europe*; G. Sergi, *The Mediterranean Race*; O. Schrader, *Prehistoric Antiquities of the Aryan Peoples*; J. M. Edmonds, *Introduction to Comparative Philology*.

INDORE, or **INDOR,** a protected native state of India, connected with Central India, and consisting of several detached portions, the largest being bisected by the Narbada; total area, 9,519 sq. miles. It forms the remnant of the sovereignty of the Mahratta dynasty of Holkar, and Holkar as the family name is associated with the title Maharajah, which belongs to the ruler of the state. It is traversed by the Vindhya Mountains, and much of the country is well wooded.

Indore is generally fertile, the cultivated crops including wheat, rice, millet, cotton, sugar-cane, oil-seeds, tobacco, and opium, which is one of the principal products. Amongst the inhabitants are numerous Bheels. The ruling class are Mahrattas. The Holkar dynasty was founded by Mulhar Rao in the early half of the eighteenth century, its dominions being at one period much more extensive than at present. Pop. 1,151,598.

INDORE, the capital of the state of Indore, is of modern origin. The Maharajah's palace is the most conspicuous building. The British Residency is one of the handsomest in India. Pop. (1931), 127,327.

INDRA, the great national god of Vedic India. He lost his supremacy through the rise of Brahma, Vishnu, and Siva, but he is still a figure in the Hindu Pantheon. Originally he represented the sky or heavens, and was worshipped in the Vedic period as the supreme god.

He is commonly represented with four arms and hands riding on an elephant; in two hands he holds a lance, and in the third a thunderbolt. When painted he is covered with eyes; he is then called Sahasraksha, or 'the thousand-eyed.'

He is at once beneficent as giving rain and shade, and awful and powerful in the storm as wielding the thunderbolt. In one aspect he is lord of *Swarga*, the beautiful paradise where the inferior gods and pious men dwell in full and uninterrupted sensuous felicity.—BIBLIOGRAPHY: W. J. Wilkins, *Hindu Mythology, Vedic and Puranic*; J. Dawson, *A Classical Dictionary of Hindu Mythology and Religion*.

INDRE (andr), a department of Central France; area, 2,664 sq. miles. It belongs to the basin of the Loire, which receives its waters by the Indre, a river of 140 miles length, the Creuse, and the Cher. The department is generally flat, and nearly two-thirds of the surface is arable. Large crops of wheat and barley are produced; other important crops are hemp and flax. A considerable quantity of land is occupied by vineyards. The minerals include iron, lithographic stones, and several varieties of marble. The principal manufactures are woollens, and iron and steel goods, linen, and hosiery. Châteauroux is the capital. Pop. (1931), 247,912.

INDRE-ET-LOIRE (andr-e-lwär), a department of Central France; area, 2,377 sq. miles. It belongs to the basin of the Loire, and is traversed both by it and its tributary the Indre, as also by the still more important tributaries the Vienne and the Creuse,

Indra, Colman's Hindu Mythology

besides the Cher. They are all navigable within the department, and furnish it with almost unlimited means of water communication.

The surface is finely diversified, and more than one-half is arable. Hemp and flax are extensively cultivated, and fruit is very abundant. Iron is worked to some extent; and there are valuable millstone quarries. Clay, both for ordinary purposes and the finer kinds of pottery, is abundant. The manufactures are not of much importance. Tours is the capital. Pop. (1931), 335,226.

INDUCED CURRENT, the current of electricity which is produced or excited in a conductor when the magnetic field in which it is placed is altered in any way; that is, first, when the strength of the current in a neighbouring conductor is altered; or, second, when a neighbouring conductor in which a current flows is altered in position; or, third, when a neighbouring magnet is moved; or, fourth, when

the magnetization of a neighbouring magnet is altered. Thus if there is a closed circuit, say a coil of wire with its ends joined, through which no current is passing, the motion of a magnet in its neighbourhood will induce a current in it, the direction of this current being always such as to oppose the motion. *See* MAGNETISM; ELECTRO-MAGNETISM; ELECTROMOTIVE FORCE; GENERATOR; INDUCTANCE.

INDUCTANCE, or coefficient of self-induction, of an electric circuit may be defined either as the magnetic flux which threads the circuit in consequence of the flow of unit current in the circuit, or as the back E.M.F. induced in the circuit when the current is changing at unit rate. More generally, flux = inductance × current, and back E.M.F. = inductance × time rate of increase of current.

In the practical system the unit of inductance is the *henry*, which is the inductance of a circuit in which the induced E.M.F. is 1 volt, when the current changes at the rate of 1 ampere per second. The inductance of a circuit has an important influence when the circuit is carrying an alternating current. The following is a brief sketch of the theory.

Let resistance = R ohms; inductance = L henrys; and, at time t seconds, let current = i amperes, and applied E.M.F. = e volts. The induced back E.M.F. is $L(di/dt)$. The applied E.M.F. has to drive the current against the back E.M.F. and the resistance. Hence $e = L(di/dt) + Ri$. In the simplest case e is sinusoidal, or $e = E \sin pt$, where E is constant. Here e goes through all its phases in time $2\pi/p$ so that there are $p/2\pi$ cycles per second, and $p = 2\pi k$, where k = number of cycles per second. The differential equation for i is now

$$L(di/dt) + Ri = E \sin pt.$$

The complete solution is:

$$i = Ae^{-Rt/L} + E(R \sin pt - Lp \cos pt) \div (L^2p^2 + R^2),$$

where A is a constant. The first term, that involving A, becomes very small as t increases (for the study of this term, see C. P. Steinmetz, *Transient Phenomena*), and in the steady state the value of i is given by the second term alone. Introducing an auxiliary angle α, such that $\cos\alpha = R \div \sqrt{(L^2p^2 + R^2)}$, $\sin\alpha = Lp \div \sqrt{(L^2p^2 + R^2)}$, $\tan\alpha = Lp/R$, we get for the steady value of i,

$$i = E(\sin pt \cos\alpha - \cos pt \sin\alpha) \div \sqrt{(L^2p^2 + R^2)} = \{E/\sqrt{(L^2p^2 + R^2)}\} \sin(pt - \alpha).$$

If we write I for $E/\sqrt{(L^2p^2 + R^2)}$, this becomes $i = I \sin(pt - \alpha)$. The phase of i, viz. $pt - \alpha$, is α behind the phase of e; α is called the *lag* of the current behind the voltage. If L is zero, i.e. if the inductance is negligible, the value of I becomes E/R instead of $E/\sqrt{(L^2p^2 + R^2)}$. Thus, in the inductive circuit, the quantity $\sqrt{(L^2p^2 + R^2)}$ takes the place held by the resistance R in a non-inductive circuit. The quantity $\sqrt{(L^2p^2 + R^2)}$, usually denoted by Z, is called the *impedance*, in a circuit of resistance R and inductance L. Lp is called the *reactance* (q.v.), so that (impedance)^2 = (resistance)^2 + (reactance)^2. The energy

$$\text{lost by the circuit, per cycle} = \int ei\,dt,$$

$$\text{over 1 cycle} = \int L(di/dt)i\,dt + \int Ri \cdot i\,dt.$$

The integral containing L is zero, for $i\,di/dt$ is the derivative of $\frac{1}{2}i^2$, which has the same value at the beginning as at the end of a cycle. (Otherwise the phase of the induced E.M.F. is 90° behind the phase of the current, since $-\cos(pt - \alpha) = \sin(pt - \alpha - 90°)$ E.M.F. and current are in this case said to be in *quadrature*, and the work is easily proved to be zero.) Hence

$$\text{energy lost by circuit} = \int Ri^2dt = \tfrac{1}{2}RI$$

which, from the values given above for $\cos\alpha$ and I, is at once seen to be $= \frac{1}{2}IE\cos\alpha$. This can be written $(I/\sqrt{2})(E/\sqrt{2})\cos\alpha$ = (root-mean-square current) · (root-mean-square voltage) · $\cos\alpha$.

The root-mean-square current and voltage are those read from an ammeter and voltmeter. The apparent watts = measured amperes × measured volts = $\frac{1}{2}IE$; the true watts = $\frac{1}{2}IE\cos\alpha$ = apparent watts × *power factor* where the power factor is $\cos\alpha$. *See* ELECTRO-MAGNETIS ; ELECTROMOTIVE FORCE; IMPEDANCE; IMPEDANCE COILS; GENERATOR.—BIBLIOGRAPHY M. Maclean, *Electricity and its Practical Applications*; F. B. Pidduck, *A Treatise on Electricity*; C. P. Steinmetz, *Alternating Currents*; C. G Lamb, *Alternating Currents*.

INDUCTION, in logic, is that process of reasoning by which we ris from the particular to the general, an is the counter-process to deduction In induction particulars are not onl raised into generals, but these int still higher generalities. In followin this method we proceed from th known to the unknown, and obtain conclusion much wider than the pr mises. Thus a person who has h any experience easily arrives by i duction at the conclusion that fi burns wood, and when any piece wood whatever is presented to hi he will have no hesitation in sayi that fire will burn it.

As it is impossible that all partic lars can be observed, there is alway certain risk of error, and the inducti method must be worked with extre

aution; but science properly so called ;ould be impossible if we did not pre-uppose a faculty of arriving from ex-ɔerience at the knowledge of truths ɔot contained in that experience. Hence the ground of induction is the stablished fact that nature is uniform.

INDUCTION, in English ecclesiasti-al law, the investing of a clerk pre-ented to a benefice with the tem-ɔoralities thereof. The person induct-ng takes the clerk by the hand, and ays it on the ring, key, or latch of the hurch-door or wall of the church; or ɛe delivers a clod, turf, or twig of he glebe, and thus gives corporal ɔossession of the church.

The doors are then opened, the clerk ɔut into the church, and the bell tolled e make the induction known. The ncumbent must assent to the Thirty-ine Articles and the *Book of Common Prayer*, and take the oath of allegiance. n Scotland the minister is inducted ɔy the presbytery.

INDUCTION, ELECTROMAG-ɛETIC. *See* INDUCED CURRENT; ELECTROMOTIVE FORCE.

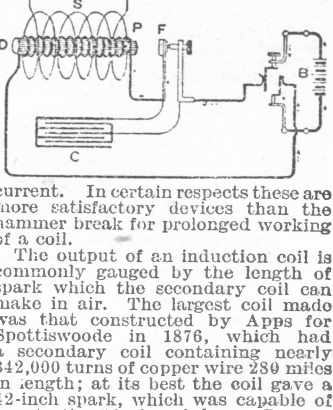
INDUCTION, ELECTROSTATIC. *See* ELECTRICITY under heading ELEC-ROSTATICS.

INDUCTION, MAGNETIC. *See* ELECTRO-MAGNETISM; MAGNETISM.

INDUCTION COIL, an electrical ɔparatus which is used to transform ntermittent currents of low voltage nto intermittent or oscillatory cur-ents of high voltage. It is employed ɔ producing X-rays, and as part of the ransmitting mechanism in wireless elegraphy, also for causing ignition ɔ internal-combustion engines, for the tudy of electric discharges in vacuum ubes, and for the production of faradic nd high-frequency currents for thera-eutic purposes. The induction coil onsists of an inner or primary coil ɔith a core of iron wires. Round the rimary coil and insulated from it is ɛe secondary coil, which is built up, ɔ partitioned sections, of a large umber of turns of fine wire. The cur-ɛnt in the primary coil undergoes eriodic interruptions caused by an utomatic device which makes and reaks the current.

In the hammer break shown in the gure, which represents diagrammati-ally the different parts of an induc-on coil, when the current flows from ɛe battery B through the primary coil the soft-iron mass F is attracted to ɛe wire core D, and the current is thus roken at the contact A. On the cur-ɛnt stopping, the mass F ceases to be ttracted, and the spring E causes con-ɔct to be made again at A. This ɔtion causes the iron core to be mag-ɛtized at make, and to be demag-netized at break, and these rapid changes in magnetization create in-duced currents in the secondary coils, the current flowing in one direction through S at make, and a stronger current flowing in the opposite direc-tion at break. The condenser C is generally connected across the inter-rupter FA, as in the figure; it tends to quench the spark which occurs at break, and thus to increase the electro-motive force of the corresponding in-duced current in the secondary.

After interruption the current in the primary coil flows into the con-denser and becomes oscillatory, and by induction an oscillatory current is generated in the secondary; this secon-dary current has two components with different frequencies. Besides the hammer break, also known as the trembler or buzzer, the mercury inter-rupter and the electrolytic interrupter are employed to break the primary



current. In certain respects these are more satisfactory devices than the hammer break for prolonged working of a coil.

The output of an induction coil is commonly gauged by the length of spark which the secondary coil can make in air. The largest coil made was that constructed by Apps for Spottiswoode in 1876, which had a secondary coil containing nearly 342,000 turns of copper wire 280 miles in length; at its best the coil gave a 42-inch spark, which was capable of penetrating 3 inches of glass.—BIBLIO-GRAPHY: J. A. Fleming, *The Alternate Current Transformer*; E. T. Jones, *Theory of the Induction Coil*

INDUCTION GENERATOR, an in-duction motor (q.v.) driven by a prime mover above 'synchronous' speed. If such a generator is connected to a 'live' alternating-current system, it will pump electrical energy into the system. The current it delivers to the network 'leads the pressure of the machine (*see* VECTORS). It is an asyn-chronous machine, and hence can be used without any synchronizing gear. The machine magnetizes itself, de-riving its magnetizing current from the live system, and consequently an alternating-current system could not

be run entirely by means of induction generators.

Direct-current generators must exist, in association with some of the alternating-current generators in use on the system, to supply the steady magnetizing current required by it. Induction generators are used to some extent in the United States, but are very rare in this country.

In three-phase electric-traction schemes the induction motors on the locomotives can be used to generate power when trains are descending gradients. This fact is one of the points in favour of the three-phase traction system for electric railways in hilly districts. Not only do the descending trains generate electrical energy, but the generation of this energy automatically 'brakes' the train, and the energy does not have to be dissipated, as it otherwise would, in heating the brakes, with consequent expensive wear and tear of rails, wheel-tyres, and brake-blocks. Such systems of traction are known as 'Regenerative Control Systems.'—BIBLIOGRAPHY: H. M. Hobart, *Polyphase Generators and Motors*; A. T. Dover, *Electric Traction*.

INDUCTION MOTOR. For a general description *see* ELECTRICITY. The arrangement of the stator coils depends on whether the motor is a two- or three-phase one, and on the number of poles. In a three-phase motor, for instance, the stator is wound very much like an alternating-current generator. The conductors of each phase are disposed so that each phase is 120 electrical degrees in advance of the preceding phase. Each phase is fed with alternating current, which is one-third of a period out of phase in time with either neighbouring phase.

The result of this distribution of coils and of feeding is that a magnetic field is set up which rotates about an axis parallel to the shaft at a speed corresponding to the frequency of the supply. Thus if the motor is a six-pole one and fed with 25-cycle current the magnetic field rotates at $\frac{25 \times 60}{3}$ =500 r.p.m. The magnetic field sets up induced currents in the conductors of the rotor, with the result that the rotor races round at a speed of rotation just short of that of the field. The difference in the speeds of rotation expressed as a percentage of the speed of the magnetic field is called the *slip* of the motor.

Starting. The *starter* of a slip-ring motor is a simple arrangement, consisting merely of a circuit breaker and an adjustable liquid or metallic resistance, which is connected to the slip-rings and can therefore be switched into the rotor circuit at will. With this starter, a high starting torque can be obtained, without taking an excessive current from the electric mains. The methods of starting squirrel-cage motors are more varied. Motors up to 5 h.p. are usually started with a single-throw switch, which need not be oil-insulated.

The starting current, though *relatively* excessive, is usually not high enough to cause any difficulty in public supply-mains. Motors above 5 h.p. are usually started in one of two ways. One method is to use a *star-delta* starter if they are three-phase motors; or a series-parallel arrangement if they are two-phase motors. The star-delta starter is an arrangement for putting the stator coils in star connection at the start and in delta connection when running (*see* WINDINGS, ARMATURE). In this way the starting pressure applied to each phase is only some 58 per cent of the running pressure. The second method uses an *auto-starter*, which is a small oil-insulated auto-transformer.

Each kind of starter is provided with a *no voltage* and *overload release* (*see* SWITCH-GEAR). The star-delta starter is suitable for voltages up to 500. It will give a starting torque of about 50 per cent of the full-load torque, the starting current being about 1·7 times to twice the full-load current. The auto-starter is more costly, but has advantages over the star-delta, viz. the voltage applied at starting can be varied so as to get the exact starting torque required, and the line current is therefore kept to the minimum.

Operating Data. The following operating data may be useful to users of these motors. *Slip*: 7 per cent for small motors; 4 per cent for large motors (5 to 100 h.p.) at full load. *Stalling torque*, i.e. the maximum torque the motor will give without stopping, is about 2½ times the full-load torque. *The usual temperature rise for induction motors* is about 40° C. at normal full load. The temperature rise goes up some 2½ per cent for 1 per cent increase of output, up to a temperature rise of, say, 50° C.

Overloads: Induction motors can carry a 25 per cent overload for half an hour, a 50 per cent overload for a quarter of an hour, and a 100 per cent overload momentarily. *Power factor and efficiency* depend greatly upon the output of the motor. Usual figures for a 20-h.p. motor at full load would be about 96 per cent efficiency and 92 per cent power factor.—BIBLIOGRAPHY: H. M. Hobart, *Electric Motors*; C. P. Steinmetz, *Alternating Currents*. Much useful data can also be found in the standard specification

for electrical machinery issued by the British Engineering Standards Committee.

INDULGENCE, in the Roman Catholic Church, is the remission granted by the Church to a repentant sinner, of the temporal punishment due to his sin, whether this punishment be the pains of purgatory, or penance which the Church has the right to impose according to the gravity of the sin. It must be understood that the indulgence is never to be considered as constituting a remission of the sin itself.

The principle of indulgences rests on that of good works. Many saints and pious men have done more good works and suffered more than was required for the remission of their sins; these are known as *works of supererogation*, and the sum of this surplus constitutes a treasure for the Church, of which the Pope has the keys, and is authorized to distribute as much or little as he pleases in exchange for pious works or gifts.

Indulgences are of two kinds: *plenary* when considered an equivalent substitute for all penance; and *partial*, when only a portion of penitential works is relaxed. *Local* indulgences are attached to particular places, *real* indulgences to crucifixes, medals, &c.

The historical origin of indulgences is traced to the public penances and the canonical punishments which the early Christian Church imposed on offenders, especially on those who were guilty of any grievous crime, such as apostasy, murder, or adultery. When ecclesiastical discipline became milder it was allowed to commute these punishments into fines for the benefit of the Church. The first recorded instance of the use of the name indulgence was by Alexander II in the eleventh century, and the institution itself was in full development during the Crusades.

At first the only source of indulgences was in Rome, and they could be obtained only by going there. The abuse of the system of granting indulgences, known as the 'sale of indulgences,' inflamed the zeal of Luther, and the Protestant theologians have always found indulgences one of the most vulnerable points of the Roman Catholic system.—Cf. H. C. Lea, *A History of Auricular Confession and Indulgences in the Latin Church.*

INDUS, the chief river of north-west Hindustan. It has a length of about 1,800 miles, drains an area of about 372,000 sq. miles, and rises north of the Himálaya Mountains, in Tibet. At first it flows in a north-westerly direction, but after bursting through the Himalaya flows south-west till it enters the Indian Ocean. At Attock it is joined by the Kabul from Afghanistan, and here, 950 feet above the sea, it is nearly 800 feet wide, and from 30 to 60 feet deep according to the season. Near Mittan-kot it receives on the east the Panj-nad, or united stream of the 'Five Rivers' of the Punjab.

In Sind it gives off several extensive arms or canals, which are of great value for irrigation; and below Hyderabad it divides into a number of mouths. Its delta extends about 130 miles along the coast. Vessels drawing more than 7 feet cannot generally enter any of its mouths; but steamers of light draught ascend from Hyderabad to Multan. The river is spanned by several bridges, the chief being the cantilever bridge of Sakkar.

INDUSTRIAL AND PROVIDENT SOCIETIES, societies that carry on some trade or activity for the mutual benefit of the members. Most of the trade unions and the Co-operative societies are registered under the Industrial and Provident Societies Acts. In Great Britain various Acts have been passed for the regulation of such societies, the most important being in 1893, amending and consolidating all previous Acts, the first of which dates back to 1852. The societies which may be registered under this Act are societies for carrying on any industries, businesses, or trades specified in or authorized by their rules, whether wholesale or retail, of which societies no member other than a society registered under this Act shall have or claim an interest in the funds over £200.

No society can be registered which has fewer than seven members; and every society must have a registered office; must publish its name (with 'limited' added) outside the office and elsewhere; must submit its accounts to an annual public audit; and must send annual returns to the registrar. A register of the members' names must be properly kept. The registrar, on application of one-tenth of the members, may, with the consent of the Treasury, appoint one or more inspectors to examine the affairs of the society and report theron. No registered society which has any withdrawable share capital shall carry on the business of banking.

Every registered society which carries on the business of banking must on the first Mondays in February and August in each year make out and keep conspicuously hung up in its registered office a statement in a prescribed form showing its assets and liabilities. The takings of deposits of not more than ten shillings in any one payment, nor more than twenty pounds for any one depositor, payable on not less than two clear days' notice,

is not regarded as 'banking'; but no society which takes such deposits can make any payment of withdrawable capital while any claim due on account of any such deposit is unsatisfied.

INDUSTRIAL NEGOTIATIONS, adjustment of industrial disputes and the framing of agreements regulating conditions of employment by means of collective bargaining are the prime objects of industrial negotiations. The term is applied usually to the discussions carried on by representatives of employers' organizations and the trade unions; but the State has also provided, in many countries, extensive machinery for the same purpose. Both the employers' and the workers' organizations have evolved an elaborate technique and use the services of highly-qualified and competent agents for the purpose of industrial negotiations.

The characteristic British form of negotiating machinery is the voluntary system of collective bargaining which has existed in many industries from about the middle of last century. It was at that time that employers' associations and well-organized craft unions on a national basis began to appear. In its most highly developed form the voluntary system can be seen in the extremely complicated but efficient machinery in the cotton textile industry, where both sides are well organized, the employers in two federations, the operatives in about half a dozen great amalgamations of mainly autonomous district or local unions. Collective bargaining between these bodies is carried on into minute details of workshop and factory conditions, covering not only price-lists by which wages are calculated, hours of labour and similar general questions, but also arrangements for cleaning, working of looms and so on. For more than 20 years, from 1892 to 1913 the cotton industry was regulated by a great instrument of collective bargaining known as the Brooklands Agreement; similar agreements voluntarily entered into by both parties have operated for long periods in other industries. Side by side with these major agreements are various forms of joint machinery for the settlement of local difficulties. Local agents of the big unions in nearly all the trades are meanwhile kept busy day by day dealing with still smaller troubles affecting groups of workmen or individuals in their areas which necessitate negotiations with employers or their managers. Local difficulties that are not thus smoothed away may come up for discussion in larger joint councils and may even reach the central joint bodies in the industry concerned. In normal times such day-to-day negotiations suffice to keep the wheels of industry turning.

An important feature of the machinery of industrial negotiation has been the creation of voluntary conciliation boards of various types. In 1891 these had developed to such an extent that the Royal Commission of that year appointed to investigate the problem of industrial relations recommended the creation of a central Government department, adequately staffed, to assist them. As a result, in 1896, there was passed the *Conciliation Act*, which conferred on the Board of Trade statutory authority to intervene in industrial disputes. Five years later, to facilitate the working of the Act, an Industrial Council was set up, composed of 26 representative employers and trade unions leaders, in equal numbers, with Sir George (later Lord) Askwith as chairman, and Mr. (now Sir Horace) Wilson as registrar; the latter is now (1933) Chief Industrial Adviser to the Government. During the great industrial unrest in the five or six years preceding the War Sir George Askwith earned a great reputation as industrial peacemaker. The machinery of the Industrial Council and the Conciliation Act, 1896, were replaced by the *Industrial Courts Act*, 1919, which established a permanent court of arbitration, as well as *ad hoc* boards of arbitration and conciliation boards. This machinery applies to the well-organized trades; for the unorganized trades the machinery of the Trade Board Acts has been established. This 1919 Act was the outcome of the Whitley Report, which also produced an elaborate system of joint councils, works committees and similar bodies to facilitate the settlement of industrial disputes.

At the other extreme from the voluntary system of industrial negotiation stands the legal system adopted in many countries. Conspicuous among these countries are New Zealand and Australia, Canada, and many of the States of the American Union. The principle of this system is judicial or quasi-judicial settlement of industrial disputes by tribunals whose findings have sometimes the force of law.

From time to time efforts have been made to establish, in addition to the machinery of voluntary negotiation by organizations of employers and workpeople a system of National Industrial or Economic Councils, sometimes called *Industrial Parliaments*. Typical of this development was the Industrial Council set up in 1911 under Sir George Askwith. In 1919 the National Industrial Conference convoked by the Lloyd George Government proposed the creation of a body of this kind on larger and more ambitious lines. The

scheme, which contemplated the establishment of a permanent National Industrial Council to be composed of 400 members, representing employers and trade unions in equal numbers, with the Minister of Labour as President and a standing committee of 50 members (25 from each side) did not materialize. Councils of industry similar to this in many respects were established in France, Belgium, Germany, Italy, the Netherlands, and Spain. The most important experiment of the kind was attempted in Germany, in accordance with the provisions of the Weimar Constitution (1918), which sanctioned the creation of a Federal Economic Council, whose functions, however, were limited to advising the Government on industrial and social questions. An economic advisory council, more limited in its scope, was set up by the British Labour Government in 1929–30.

An interesting development of the system of industrial negotiations was the proposal mooted from time to time to give legal force to voluntary agreements arrived at by the normal methods of collective bargaining. The T.U.C. gave consideration to the proposal in 1921 and subsequent years and a considerable section of the Congress favoured it; but, on the whole, legalization of voluntary agreements presents difficulties in respect of the legal status of the unions, and so far no effect has been given to the proposal, notwithstanding the T.U.C. decision in 1925 to request the Government to enable national agreements negotiated by national joint councils to be given the same validity as awards under the Trade Boards Acts.

—BIBLIOGRAPHY: Askwith, *Industrial Problems and Disputes*; Watkins, *Introduction to the Study Of Labour Problems*; *Survey of Industrial Relations* (Committee of Industry and Trade, 1926); *Reports on Collective Agreements*, &c.; Clay, *The Problem of Industrial Relations*; Mond (Lord Melchett), *Industry and Politics*.

INDUSTRIAL SCHOOLS. John Pounds, a poor shoemaker of Portsmouth, planted the germ of what afterwards became the industrial school in this country. He died in 1839, and for twenty years before that he gathered the ragged children of the district around him as he sat at work. They came freely and were taught gratuitously. The success attending his humble efforts soon led many more influential friends of the 'outcasts' to engage in the same work.

In 1838 London had a ragged Sunday school, which eventually became a free day school. Field Lane followed in 1843. But the first ragged feeding school was opened in 1841 by Sheriff Watson in Aberdeen. In 1845 the Rev. Dr. Robertson, not then aware of the existence of Sheriff Watson's, opened a similar school in the Vennell, Edinburgh. Soon after, Dr. Guthrie's famous *Plea for Ragged Schools* appeared, a work which gave an irresistible impulse to the movement, and caused the author to be generally regarded as the father of ragged schools. A ragged school was founded at the Castle Hill in 1847—transferred to more suitable, because specially built, premises at Liberton in 1887.

After this ragged schools spread over the land, until there was scarcely a town of any importance that had not one or more. Dr. Guthrie was also successful in obtaining from the Treasury a grant for *maintenance*—a grant which has been continued to all certified industrial schools. The finding of suitable buildings, equipment, &c., was still left to voluntary effort. Compulsory attendance at school, introduced in England in 1870 and in Scotland in 1872, practically compelled the larger School Boards to build and equip more commodious industrial schools, and this in turn led to the gradual closing of some of the older schools which had done good work in their day.

All this time industrial schools or reformatory schools, as they are sometimes called, were under the supervision of the Home Office, but in 1921 were put in charge of the Board of Education in England and the Scottish Education Department in Scotland. Children sent to industrial schools are not usually criminal in the real sense of the word, but children who are not under 'proper guardianship,' whether due to the death or misconduct of parents, or those who are waifs and strays; but children may be sent to industrial schools for such offences as theft, house-breaking &c., or for frequenting the company of a known criminal.

INDUSTRIAL UNIONISM, the type of trade union organization which embraces in a single association all grades of workers, skilled, semi-skilled, and unskilled, in a homogeneous industry is called *industrial unionism*, in contradistinction to *craft unionism*, which aims at the organization of the workers of a particular craft or trade in whatever industry they may be employed. Thus, the Amalgamated Society of Woodworkers constitutes a craft organization, recruiting its members from a variety of different industries, whereas the miners' organizations purport to be industrial unions claiming to organize all workers in and about the mines. Industrial unionism and craft unionism may sub-

sist side by side, as in the railway service, where pure craft organizations (e.g. the Railway Clerks Association and the Amalgamated Society of Locomotive Engineers and Firemen) co-exist alongside the National Union of Railwaymen which caters for every railway worker, including the waiters in restaurant cars and mechanics in the railway engineering shops.

Industrial unionism aims at assimilating the workers' organization to the capitalist structure of industry and corresponds to a vertical 'Trust' (i.e. to the form of business organization which aims at bringing every branch of a given enterprise from the raw material stage to the distribution of the finished product under a single and undivided control). As a policy, industrial unionism is the method of the radical or left wing elements of trade unionism as represented by the Industrial Workers of the World (I.W.W.), the extreme syndicalist organization founded in the United States about 1903, largely under the influence of the Socialist teaching of Daniel De Leon, and having many affinities with the 'General Strike' propaganda of French syndicalism and the teaching of Georges Sorel.

The existence of several types of trade union organization competing for the allegiance of the same grades and classes of workers gives rise to jurisdictional or demarcation disputes, particularly as between craft unions and industrial unions. British trade unionism has endeavoured to minimize these conflicts by developing a policy of amalgamation among the craft unions and the formation of federations of unions within homogeneous industries, such as the engineering and shipbuilding trades, the building trades, and the iron and steel trades; in the latter an interesting form of organization, unique in character, has been evolved, partaking of the nature of a federation as well as of an industrial union. General labour unions, some of them of a gigantic size, have also been evolved by British trade unionism which approximate to the industrial union as the term is loosely applied; in its strict sense industrial unionism, however, refers to the single unit of organization for the workers of all grades in each separate industry.—BIBLIOGRAPHY: W. M. Citrine, *The Trade Union Movement of Gt. Britain*; Watkins, *Introduction to the Study of Labour Problems*; Brooks, *American Syndicalism: The I.W.W.*

INDUSTRIAL VILLAGES, villages established for the amelioration of the condition of the working-classes and for giving the workers a better opportunity of bringing up their families in good surroundings. The conditions of the labourer in the early days of the factory era were often deplorable, and many attempts at improvement have been made. Robert Owen was one of the first to show regard for his work-people at the mills of the New Lanark Twist Company. Sir Titus Salt, also, founded in 1853 the village of Saltaire for his woollen operatives.

A more modern instance is Port Sunlight, started in 1888 by W. H. Lever (later Lord Leverhulme). Port Sunlight has been built for the work-people at the great soap-factory, and the houses are let at low rents only sufficient to cover the cost of repairs and maintenance without giving any return on the capital expended in building the houses.

The village is arranged on 'town-planning' lines. Each house has a garden, and there are numerous allotments for those desirous of cultivating the soil. Numerous public buildings have been built—a library and museum, entertainments' hall, hospital, men's club, schools, and a church.

Bournville, started by Mr. George Cadbury in 1879 and developed from 1894 onwards, is another example. In this case the houses are not reserved for the workers at the Bournville Cocoa Factory, but are available for all workers, while rents are on an 'economic' basis. The houses have gardens back and front, which are cultivated by the tenants. Public buildings are the schools, Ruskin hall, the inn, and the meeting-house. An interesting feature of Bournville life is the village council, a committee elected by the householders to further the interests of the village.

Stimulated by these private experiments groups of reformers founded companies to carry out extension of the town-planning and model village idea; and successful experiments on these lines have been established at Letchworth (Hertfordshire), a self-contained industrial town, and Hampstead Garden suburb, a residential centre.

Significant developments have also taken place in recent years in the planning of mining villages, particularly in new coal areas; this development of the industrial village movement has been assisted by the existence of the Miner's Welfare Fund and has produced some striking results in parts of the South Yorkshire coal-field, Nottinghamshire, Northumberland, Kent, and South Wales. Good examples of 'industrial villages' are New Earswick, near York, and Woodlands, near Doncaster, a model colliery village. On the Continent the most important experiments are those carried out by the firm of Krupp

at Essen. In the early 'sixties the firm built cheap and ugly but serviceable barracks, but from 1890 onwards the 'garden district' idea was applied, and neatly-designed houses with beautiful gardens have been erected.

INERTIA, that property of matter in virtue of which a body remains in its state of rest, or of uniform motion in a straight line, unless it is compelled by force to change that state. This law of inertia is the first of Sir Isaac Newton's three Laws of Motion (q.v.). The inertia of a body is measured by its mass.

INERTIA, MOMENT OF. If a material body is divided into a large number of parts, all very small, and if the mass of each of these parts is multiplied by the square of its distance from a given line or axis, then the sum of all these products is called the moment of inertia of the body about the axis, or $I = \Sigma(mr^2)$.

The moment of inertia has the same importance (i.e. moment), in motions of rotation about the axis, as inertia itself (i.e. mass) has in motions of translation. When a body, free to rotate about a fixed axis, is subjected to force, then its angular velocity about the axis is accelerated, and angular acceleration = (moment of applied forces) ÷ moment of inertia, both moments being taken about the axis of rotation. *See* KINETICS.

INFALLIBILITY, exemption from the possibility of error in regard to matters of religion and morals—a claim made by the Roman Catholic Church both on its own behalf and on that of the Pope when speaking *ex cathedra*, or in his official capacity. The infallibility of the Church is of two kinds, *active* and *passive*; the former signifying the function of the Church of permanently teaching the truths of God, and of authoritatively settling doctrinal disputes; and the latter that property inherent in the Church in virtue of which she can never receive or embrace erroneous doctrines.

The infallibility of the Pope, long taught, was only settled as an article of faith in the Vatican Council of 1870. The dogma was then formulated in the following terms: "We teach and define that it is a dogma divinely revealed; that the Roman pontiff, when he speaks *ex cathedra*—that is, when in discharge of the office of pastor and doctor of all Christians, by virtue of his supreme apostolic authority, he defines a doctrine regarding faith or morals to be held by the Universal Church, by the divine assistance promised to him in blessed Peter—is possessed of that infallibility with which the Divine Redeemer willed that His Church should be endowed for defining doctrines regarding faith or morals, and that, therefore, such definitions of the Roman pontiff are irreformable of themselves, and not from the consent of the Church."

A considerable body who refused to accept the infallibility of the Pope as one of the dogmas of the Church formed themselves into a separate Church calling themselves Old Catholics(q.v.)—BIBLIOGRAPHY: Mgr Joseph Fessler, *La Vraie et la Fausse Infaillibilité*; G. Salmon, *The Infallibility of the Church*; J. R. Illingworth, *Divine Transcendence*.

INFANT, a term in the English and American law for persons who have not attained their *majority*, that is, the age of twenty-one years, and are under guardianship. In general, contracts made by infants are not binding except for necessaries suited to their state in life and beneficial contracts of service. Being an infant is no bar to criminal proceedings or to actions of tort; but young persons are not punished for offences if they have not knowledge and discretion to distinguish them to be such.

Infants require the consent of parents or guardians to marry. The jurisdiction in respect to infants is generally vested in either probate or orphans' courts. These courts appoint guardians to take charge of the property of infants, and, in case of the decease of the father, to take charge of their persons; but during the life of the father he has the guardianship and control of the persons of his children until they are twenty-one years of age. An infant, other than a soldier on service or a marine or seaman at sea, cannot make a valid will. Full age is attained on the day preceding the twenty-first birthday.

INFANTICIDE (Lat. *infans*, infant, and *cædere*, to kill), a crime that is especially common in the case of illegitimate children. In trial for infanticide it must be proved that the child was born alive.

By the Infanticide Act, 1922, when a woman by any act or omission causes the death of her newly-born child, but at the same time had not fully recovered from the effect of giving birth to such child, and by reason thereof the balance of her mind was then disturbed, she is guilty of infanticide, and may be punished, as if guilty of manslaughter although, but for this Act, she would have been guilty of murder. Infanticide was prevalent in Greece and Rome. In modern times many barbarous nations are guilty of wholesale child-murder.

INFANT MORTALITY. Strictly speaking, the phrase means mortality

of babies less than one year old, the infant mortality figure being

$$\frac{\text{Deaths of children under 1 year}}{\text{Number of births}} \times 1{,}000$$

for the period and locality under review. Thus mortality of babies over twelve months is excluded.

Until the year 1905 no special efforts had been made to reduce the infant mortality figure, although Medical Officers of Health in different parts of the country had directed attention to the lamentably excessive numbers of baby deaths. Prior to that period, out of seven babies born in England and Wales only six attained their first birthday on an average, while during unfavourable summers in industrial towns infants died in such numbers that if the rate had continued during the other seasons of the year, the whole infant generation of that year would have been eliminated from the population.

The Maternity and Child Welfare Act, 1918, had an important bearing upon the problem of reducing infant mortality and successive Ministers of Health have been zealous in encouraging efforts in this direction; local authorities have established Maternity and Child Welfare centres; and voluntary organizations have conducted Baby Weeks', with the same end in view. As a result, infant mortality rates have been practically halved, from 154 per 1,000 births in 1900 to 75 per 1,000 in 1924, and since then the trend has been consistently downwards.

During recent years such an improvement has occurred that at least nine out of ten babies may be expected to complete their first year of life. The conditions which permitted the former deplorable state of affairs were ignorance, apathy, and the idea that death is inevitable.

A close consideration of the components of the infant mortality figure made it clear that a considerable proportion of the deaths of babies resulted from causes which were clearly and readily preventable. Constitutional or inherited diseases, developmental inperfections, and suchlike, only accounted for a relatively small proportion of the deaths, while diseases of the intestinal tract, coupled with malnutrition indicating improper feeding (an examination of 1,000 consecutive *deaths* under one year of age showed that only one out of sixteen had been breast-fed—the remaining fifteen being artificially fed), and diseases of the respiratory system indicating improper exposure to bad weather, constituted the bulk of the deaths.

Of late years the subject has attracted much public attention—largely as the result of national and international congresses, as well as of much attention being directed to it in the Press. To-day officers of sanitary authorities, whose duties are exclusively directed to ameliorate the conditions of infancy, are generally employed—every city, every county, and every county borough has departments specially devoted to this work.

At the same time voluntary agencies have grown up in large numbers—mothers' clubs, babies' welcomes, infant-welfare centres, day nurseries, and clinics *et hoc genus omne* abound, especially in our large cities, where their activities are likely to be most useful.

IN'FANTRY, the foot-soldiers of an army. It is impossible, within the scope of this article, to trace the history of infantry back through the centuries, nor does it appear to be necessary; but, in order to show that the essential principle of infantry work is much the same in the twentieth century as it was in the tenth, it is advisable to take a glance at the Saxon era of our history, and to note very generally the growth and development of the arm to comparatively modern times, when infantry assumed the principal rôle in battle.

In Saxon times an obligation to defend his country when required was admitted by every free man, and when all men were armed and were familiar with the use of some weapon or other, an army was almost entirely composed of foot-soldiers. These brought with them the particular form of weapon in which they put their trust, and formed themselves into bodies of varying sizes under their county magnates or thanes.

These thanes, who acted as officers, were in most cases mounted, but in general their horses were used merely as a means of locomotion, and when it came to a question of fighting, the thane left his horse and fought on foot with his men in exactly the same manner that infantry mounted officers do in these days. The one idea was to get to close quarters with the enemy, kill or capture him in a hand-to-hand encounter, and so win the battle.

That this is the same principle which is still in favour is evident from the following extract from the British Field Service Regulations: "The main object of the infantry . . . is to close with the enemy and destroy him by killing or capture." Fighting in those days was largely a matter of personal prowess, and, as neither side could manœuvre and there was no discipline, it became merely a question of which could hit harder and stand more punishment.

In these days, though we have advanced far in our methods and means of death-dealing and can fight and inflict losses from a great distance, personal prowess and the power to hit hard and endure are still of value, for it is an axiom that decisive success cannot be won by fire alone.

With the Norman Conquest came the fashion of fighting on horseback, both horse and man being encased in armour, and for a matter of centuries the most important part of an army was its mounted contingent of knights and men-at-arms, the foot-soldiers of inferior social rank being relegated to the second place.

Gradually archers with their long-bows came to the fore, and so efficient were they that they were very largely employed in our armies to cause havoc and confusion among the opposing knights, and so afford the cavalry—the knights and men-at arms—an opportunity of charging and completing the business.

Archers were, with occasional exceptions, entirely unarmoured foot-soldiers, and for many years the bow remained the principal and most effective long-distance weapon of infantry, even after the introduction of fire-arms had caused the mounted man-at-arms to lose much of his former value and prestige; and when, towards the end of the sixteenth century, infantry had come to be organized into separate companies and regiments, the bow still retained its place as one of the five weapons to be found in each company of 100 men, the remaining four being harquebuses, muskets, halberds, and pikes; there is, moreover, little doubt that of the three missile weapons the bow was the most accurate and deadly.

In the next century, as fire-arms improved, certain infantry formations began to be armed alike with some form of fire-arm, being provided also with a sword for use at close quarters. Pikemen, especially on the Continent, which was the school for war during the whole of the seventeenth century, were sometimes formed into separate battalions until, with the general introduction of the bayonet, the pike fell into disuse, and all infantry received the musket and bayonet (q.v.). The halberd was retained for many years as the weapon of the sergeants, more as a mark of rank than anything else.

The modern arms of infantry are the rifle and bayonet, the Lewis-gun (q.v.), the rifle-grenade, the hand-grenade, and the light mortar, and the modern infantry soldier is trained in the use of all these. Of these weapons the rifle and the Lewis-gun are the only ones which can be used at any considerable distance from the enemy; the rifle is sighted for 2,800 yards, though seldom used at more than 800 yards; the Lewis-gun is similarly sighted, and can be conveniently used whenever a rifle can.

These two form the long-distance missile arms of the modern foot-soldier, while for comparatively close quarters we have in addition the light mortar and the rifle-grenade. The bayonet and the hand-grenade are for the time—the ultimate object of good infantry—when, owing to the progress made by an attacking force, the fighting assumes a hand-to-hand character. A soldier is therefore provided with a weapon for every phase of an attack, and, in the words of the Regulations, "can develop rapidly in any direction a large volume of fire and can combine fire and movement and engage an enemy at a distance or hand-to-hand."

This power of combining fire and movement is a very valuable asset to infantry, and is much insisted on in regard to training in fire tactics (q.v.). The ultimate aim of infantry should be, as already noted, to come to close quarters with an enemy, i.e. 'assault, or the immediate threat of assault, is necessary to drive an enemy from the field.' The fire power of infantry may therefore almost be considered as subsidiary to its power of movement and consequent ability to approach near enough to an enemy either to (*a*) assault, or (*b*) threaten an assault.

This power of movement in face of opposition depends mainly on two conditions, the first being the proper use of ground affording at least cover from aimed rifle and machine-gun fire, and the second an efficient covering fire by other troops and arms to subdue the fire of the defenders and to break down opposition.

Power of movement may therefore be said to be obtained by an attacking force in proportion to the amount of assistance it can (*a*) provide for itself by its own fire immediately preceding the moment of advance; (*b*) obtain during its advance by taking advantage of the configuration of the ground; (*c*) count on receiving from neighbouring bodies of troops during the advance; and (*d*) receive from artillery, machine-guns, tanks, and aeroplanes.

In the above list (*c*) and (*d*) constitute what is known as 'covering fire' and 'co-operation of the other arms,' and to quote again from Field Service Regulations: "Infantry is the arm which in the end wins battles. The co-operation of the other arms is necessary, but neither separately nor together can they defeat the enemy." In the case of artillery this co-operation takes the form of covering or barrage fire, or by what is known as

the 'creeping barrage,' the difference between the two varieties being that in the first, fire is applied in turn to definite targets, while the expression creeping barrage implies that the artillery fire is applied in the form of a wall of bursting shells immediately in front of the advancing infantry; as the infantry progress the barrage is lifted or advanced to a line a little farther ahead, and slowly and methodically moves forward according to a definite and very carefully worked out time-table.

The creeping barrage has this advantage over the ordinary covering fire in that, from the nature of its application, it tends to search out all ground over which the infantry has to pass. In both cases the object is substantially the same, i.e. to assist the advance of the infantry by preventing the enemy from manning his defences and preparing to receive the assault. It is in this way that the principles of the Regulations are carried out, and all the efforts of the component parts of the military machine working in combination are directed towards the one supreme aim of assisting the infantry to secure a decisive success.

In its plain crude meaning a decisive success implies that the enemy is driven in confusion from the field with heavy losses in personnel and material, and it is not contemplated in our Regulations that such an event can be hoped for from purely defensive action. Consequently the Regulations insist that, though defensive action may at times be unavoidable, there should always be the intention in the mind of the commander to change from a defensive to an offensive attitude at the earliest suitable opportunity; this is known as the counter-stroke or counter-attack.

In purely infantry tactics it is a rule that, should an enemy during the progress of an attack gain some advantage by penetrating a portion of the defences, he is to be attacked immediately and driven out by any available troops (i.e. a local counter-attack), but that the formations or units specially detailed for the delivery of the decisive counter-stroke at the psychological moment shall not be used for any less important operation than that of converting the defence into the attack.

We are told that fire alone cannot win battles; nevertheless, the accurate and *controlled* fire of well-trained infantry is of inestimable value in staving off defeat by superior numbers and thus obtaining at least a qualified success. It is not meant to imply that this is the only or principal use of fire—enough has been said earlier in this article to show that this is not so—but it is impossible to forget how, in the very early days of the European War, the extraordinarily accurate and rapid fire of the incomparable British soldier of those days was of the greatest value in keeping back the German hordes.

Unprovided with everything necessary for modern war—the Expeditionary Force had less than 500 light and medium field-guns, and well under 200 machine-guns—and opposed by an enemy vastly superior in numbers and abundantly supplied with all munitions, the British infantry scored a success; not a decisive success, certainly, but a success nevertheless, and one which made possible the decisive blows of later years when the other arms were in a position to afford the support which infantry is entitled to expect in order that it may do its work.

Infantry is necessarily slow in its movements, but it possesses two outstanding attributes, viz. the ability to cross any description of ground, to move by roads or across country, to fight in the sandy wastes of the Sahara, the enclosed and cultivated terrain of Europe, the bush of tropical Africa, or the barren and rocky hills of the North-West Frontier of India. Our infantry has fought, and no doubt will yet have to fight, in any or all of such countries, and provision is made in our training manuals whereby the soldier is taught to apply the principles of war and tactics to each and every occasion.

Further, infantry, unlike other arms, can move in darkness with comparative ease over rough and difficult ground. This faculty is valuable in a deliberate attack on a prepared position, as it enables infantry to gain ground during the night with possibly less loss than would be incurred in daylight. The present Regulations, based on the experiences of the European War, only contemplate such minor and local night operations.

We have said that infantry is slow in its movements, the normal rate of march *on a road* and in column of route being only 3 miles an hour, and even this rate cannot be assured when large bodies or columns composed of all arms are involved. But, though normally slow and restricted as to distance, infantry can easily be packed on or into any form of transport available, and so cover considerable distances. To all intents and purposes this converts infantry into mounted infantry, i.e. troops who, though trained and organized as infantry, are, for purposes of locomotion, provided with extraneous aids.

The thane of early Saxon days was a mounted infantryman, seeing that

he rode his horse to travel and got off him to fight; the dragoon of the seventeenth century was a mounted infantryman in that in his original form he was armed, accoutred, and dressed as a foot-soldier, and used his horse only as a means of rapid movement; so also became the extra man whom it was the custom during the Thirty Years' War to mount on the crupper; so also were the infantry soldiers, British and Indian, who in the last Burmah War were mounted on country ponies; so also were the troops in South Africa in 1900 who, in many cases, on arrival in the country were given horses and told they were mounted infantry; so too, in essence, are troops in this mechanical era who are packed into buses, lorries, and other motor vehicles and transported 40 to 50 miles to the scene of action.

The whole question is one of giving added mobility to the ordinary infantry soldier. The term 'light infantry,' still used in the titles of certain regiments, is in these days merely an honourable distinction dating back a century or more, and also finding its origin largely in a matter of mobility.

In the days when the soldier's normal training consisted entirely in the performance of rigid and complicated drill movements, and when all fighting was done in close order and in two ranks, it was found convenient to train certain regiments to manœuvre on the battlefield in open order, i.e. with an interval of a yard or more between men. In the first instance one company in each regiment was so trained, but later whole regiments became light infantry, and still later, when the light-infantry system became universal, the title was in some instances conferred as a reward for good service in the field.

After every great war changes and modifications of the existing system become necessary. After the South African War of 1899–1902 these changes to a considerable extent followed the line of imitating the methods of the enemy of that time. The Boer farmers had used their rifles with effect at very long ranges; consequently we, in our musketry training, insisted on the necessity of a man being able to hit a bull's-eye target at 1,000 yards. In drill and movement generally it was much the same; the Boers had no drill, therefore we would have none or next to none.

This phase did not last long. Now, after the greatest of all wars, we hear some enthusiasts assert that they can foresee the time when all work on a battlefield which now devolves on infantry will be performed by tanks, small and large, possibly run, electrically controlled, from a safe distance in rear; also that battles will be won and campaigns ended not by the annihilation of the enemy's personnel, the capture or killing of his soldiers, but by the destruction of his mechanical fighting-machines—to all intents and purposes a mere destruction of material.

If and when this takes place, will there not still be the human side—the population of the warring nations—to be reckoned with? And the infantry, shorn of mechanical aids, may yet once more come into its own as 'the arm which in the end wins battles.'

The infantry regiments of the British army are given below by the titles directed to be used for official correspondence. The numbers in brackets are the numbers of the old regiments of foot from which the present regiments were formed when the system of territorial or county distribution was adopted. Where the title of the regiment is obscure, the county of origin is also shown.

The Royal Scots (1).
The Queen's Royal Regiment (2). West Surrey.
The Buffs (3). East Kent.
The King's Own Royal Regiment (4). Lancaster.
The Northumberland Fusiliers (5).
The Royal Warwickshire Regiment (6).
The Royal Fusiliers (7). London.
The King's Regiment (8). Liverpool.
The Norfolk Regiment (9).
The Lincolnshire Regiment (10).
The Devonshire Regiment (11).
The Suffolk Regiment (12).
The Somerset Light Infantry (13).
The West Yorkshire Regiment (14).
The East Yorkshire Regiment (15).
The Bedfordshire and Hertfordshire Regiment (16).
The Leicestershire Regiment (17).
The Green Howards (19). Yorkshire.
The Lancashire Fusiliers (20).
The Royal Scots Fusiliers (21).
The Cheshire Regiment (22).
The Royal Welch Fusiliers (23).
The South Wales Borderers (24).
The King's Own Scottish Borderers (25).
The Cameronians (26, 90). Lowlands of Scotland.
The Royal Inniskilling Fusiliers (27, 108).
The Gloucestershire Regiment (28, 61).
The Worcestershire Regiment (29, 36).
The East Lancashire Regiment (30, 59).
The East Surrey Regiment (31, 70).
The Duke of Cornwall's Light Infantry (32, 46).

The Duke of Wellington's Regiment (33, 76). West Riding.
The Border Regiment (34, 35).
The Royal Sussex Regiment (35, 107).
The Hampshire Regiment (36, 67).
The South Staffordshire Regiment (38, 80).
The Dorsetshire Regiment (39, 54).
The Prince of Wales's Volunteers (40, 82). West Lancashire.
The Welch Regiment (41, 69).
The Black Watch (42, 73). Highlands.
The Oxfordshire and Buckinghamshire Light Infantry (43, 52).
The Essex Regiment (44, 56).
The Sherwood Foresters (45, 95). Notts and Derby.
The Loyal Regiment (47, 81). Lancashire.
The Northamptonshire Regiment (48, 58).
The Royal Berkshire Regiment (49, 66).
The Queen's Own Royal West Kent Regiment (50, 97).
The King's Own Yorkshire Light Infantry (51, 105).
The King's Shropshire Light Infantry (53, 85).
The Middlesex Regiment (57, 77).
The King's Royal Rifle Corps (60).
The Wiltshire Regiment (62, 99).
The Manchester Regiment (63, 96).
The North Staffordshire Regiment (64, 98).
The York and Lancaster Regiment (65, 84).
The Durham Light Infantry (68, 106).
The Highland Light Infantry (71, 74).
The Seaforth Highlanders (72, 78).
The Gordon Highlanders (75, 92).
The Queen's Own Cameron Highlanders (79).
The Royal Ulster Rifles (83, 86).
The Royal Irish Fusiliers (87, 89).
The Argyll and Sutherland Highlanders (91, 93).
The Rifle Brigade.

For the organization of infantry, *see* ARMY.

INFANT SCHOOLS. *See* KINDERGARTEN.

INFECTION is the process by which living, virulent microbes capable of causing disease gain access to some place in the body where they can grow and produce poisonous substances (toxins) that act upon the tissues of the body and so produce the symptoms of the disease in question. A specific infection is due to one particular kind of organism that causes a definite disease, as, for example, tetanus, produced by a special bacillus.

Non-specific infections are those which might be due to a variety of organisms. Thus many different bacteria may give rise to abscesses. The infection may be local, the bacteria developing in or near the place where the bacteria were introduced; or it may be general, the organisms growing and multiplying in the bloodstream and affecting the whole body. But local infections usually become general.

INFECTIOUS DISEASES. The history of infectious diseases in this country, as far back as reliable facts are available, indicates that almost all of them have diminished in *severity*, and that the majority have diminished in *prevalence*. The progress of disease has been capable of accurate study since 1855, when registration of the cause of death by medical practitioners was made compulsory in Scotland; more recently, as regards infectious diseases especially, a study of their actual incidence in the population has been made possible since the passing of the Notification Act, which has been in operation over the whole of Scotland since 1897, and in England since 1899.

From the data thus recorded can be calculated (*a*) death-rates from various diseases among the population, (*b*) attack rates, indicating the prevalence of individual affections in the whole country or in its several parts, down to such local inquiries as the distribution of disease in town or country, its relationship to age, mode of life, climatic conditions, type of house, occupation, school, &c. Out of this has risen the special science of epidemiology, whose function is 'to institute a rigid examination into the causes and conditions which influence the origin, propagation, mitigation, prevention, and treatment of epidemic diseases.'

As an illustration of the behaviour of infectious diseases since 1855, the table on opposite page may be quoted. The mean death-rates in decennial periods from 1855 to 1919 are given as rates per 100,000 of the population.

It will be observed that the death-rates from the principal infectious diseases, with the exception of pneumonia, have undergone a marked and significant decline. Cancer has been introduced into the table as it is the most outstanding example of a disease which has been increasing in fatality in recent years.

While a table such as this gives a rough idea of the alterations in severity of the major infections, statistical studies of the behaviour of individual diseases show that many of them are subject to periodic waves of increase and decline in their incidence as well as to seasonal variation. It is true of most of them that they have a seasonal curve within a longer 'epi-

demic' wave, which may be spread over several years.

These features of infectious disease are best illustrated by reference to individual affections.

Scarlet Fever has greatly diminished in virulence since the middle of last century. In 1866–70 the mortality rate among patients in hospital was 20 per cent, a figure which has fallen to 6 per cent in 1891–4, and to about 3 per cent at the present day. This affection is, however, about as prevalent now as then, though much milder in form. In this country the seasonal incidence is at its maximum during the autumn months.

Apart from this seasonal variation, it has, at least in large cities, a general wave-like periodicity in incidence of from ten to twelve years. For instance, since 1899 the *attack rate* in Scotland rapidly fell from nearly 190 per million of the population to under 45 in 1905, after which it immediately rose to its former level, falling again to the 1905 level in 1918, since when its incidence has again been rising. This wave of infectivity between 1905 and 1918 has not been accompanied by any very appreciable increase in severity, a clear indication that the factors which determine infectivity do not necessarily also affect the virulence of a disease.

Diphtheria is an example of an infectious disease which has tended rather to increase since definite records of notification began, a feature largely due to the development since 1910 of laboratory facilities, enabling mild cases to be detected. On the other hand, there has been a rapid diminution in the fatality of this disease, especially since the introduction of antitoxin treatment. In the early 'nineties one-third of the patients died, a figure which has now fallen to well below one-tenth. Here, again, there is evidence of a wave-like prevalence of longer duration than in the case of scarlet fever, although the yearly seasonal variations of these diseases correspond fairly closely. Statistics indicate that this disease prevails more in town than in country areas.

Enteric Fever is very obedient to sanitary progress, especially as regards purity of water-supplies and food, and communal cleanliness. Its prevalence in recent years has become so low that the death-rate has almost declined to vanishing-point, as shown in the table. The death-rate for 1919 is only 2, as compared with 42 during the decennium 1861–70. Although very much less prevalent, its case-mortality has not greatly declined, about 14 per cent of the cases being fatal.

SCOTLAND: DEATH-RATES PER 100,000 FROM CERTAIN INFECTIOUS DISEASES, 1855–1919

YEAR.	Smallpox.	Measles.	Scarlet Fever.	Diphtheria and Croup.	Whooping-cough.	All Diarrhœal Diseases.	Typhus Fever.	Enteric Fever.	Syphilis.	Cancer.	Tubercle (all forms).	Phthisis alone.	Pneumonia.	Bronchitis.
Mean 1855–60 ..	35	43	98	44	72	106	91		3	34	360	255	75	126
1861–70 ..	18	42	96	68	70	95	65	42	5	42	379	268	71	210
1871–80 ..	19	36	79	55	63	90	15	40	6	49	354	244	90	252
1881–90 ..	0	39	29	43	61	72	3	23	6	59	278	202	109	210
1891–1900 ..	1	47	19	29	52	84	1	18	5	74	239	171	130	165
1901–10 ..	1	34	9	18	44	64	0	9	5	93	211	139	145	116
1911–20 ..	1	30	10	17	35	46	0	4	5	113	158	105	153	105
1921–30 ..	0	20	6	11	23	24	0	1	3	137	107	75	134	89
1931	0	13	3	7	20	19	0	1	2	148	87	62	112	80

Typhus Fever, which has now been shown to be mainly a lice-borne infection, has greatly declined in prevalence during the past fifty years. It still occasionally occurs in the winter in sporadic form in large cities. It has proved very amenable to sanitation, and is not likely to recur in epidemic form unless some increase in infectivity takes place in the organism itself.

Smallpox has also been conspicuous by its absence since the beginning of the century. Waves of epidemic prevalence occurred in 1871–4, and again in 1900–2. Smallpox is showing a certain degree of restlessness, which may be a prelude to a period of heightened infectivity.

Measles and **Whooping-cough**, though not generally notifiable diseases, are yet very prevalent. Regarded as 'minor' infections, they are yet among the most deadly diseases in respect of numbers attacked and mortality. The measles curve has two

seasonal peaks, a higher bi-annual one in late winter or early spring, and a lower one in June, when the prevalence occurs during successive years. In addition, in large urban populations there tends to be an excessive wave of prevalence every two years. Its death-rate has shown little diminution in recent years.

Whooping-cough is somewhat less prevalent than measles, but is even more fatal, although considerable reduction in its death-rate falls to be noted. It prevails most in large industrial centres, and at one time had a death-rate of 70 per 100,000, which in more recent years has been reduced to less than half that rate. This disease also, like measles, has a definite periodicity, with a maximum occurring every second year.

Tuberculosis has steadily declined since 1870 throughout Great Britain. In Scotland the death-rate during the period 1861–70 was 379 per 100,000, pulmonary tuberculosis being responsible for a rate of 268, and other forms for 111. By the year 1919 the general tuberculosis rate had fallen to 129—a reduction to 88 in the case of consumption, and to 41 in the case of other forms of tuberculosis. This serious cause of death has shown a marked progressive reduction during the past fifty years, especially so since the beginning of this century. It still, however, occupies a prominent place in mortality tables, 40,000 to 50,000 deaths occurring yearly from pulmonary tuberculosis alone throughout the country.

Influenza, Pneumonia, &c. The death-rate from influenza, &c., is not given in the summary total already referred to, as until the marked outbreak of these diseases in 1918 influenza was not classified as a cause of death by the Registrar-General when any other cause was associated with it. The recurrence, however, of influenza and pneumonia in epidemic form in the early spring of the following year emphasized the excessive periodical fatality due to these causes, which thereafter led the Board of Health to add pneumonia, in its acute or primary forms, to the list of notifiable diseases.

During the prevalence of influenza and its complications in 1918 and 1919 the number of deaths recorded in Scotland alone was 17,575, which is much in excess of the deaths registered from other important outbreaks of infectious disease, such as the following: scarlet fever (1874–5), 11,041; measles (1893), 3,639; diphtheria (1863), 3,615.

The age incidence of deaths indicated that it was much more severe at the ages twenty-five to thirty-five than at any other period of life, a feature in distinct contrast to the general death-rate, which at the same age-period is comparatively light.

Nearly 84 per cent of the cases of influenza were associated with other causes of death, the most prevalent cause being pneumonia, which constituted nearly 64 per cent, or 11,236, of the cases.

The above account of the salient statistical features of the principal infectious diseases may be concluded with a list of the notifiable diseases now dealt with by Local Authorities.

Compulsorily notifiable: typhus, enteric, and typhoid fever; continued and puerperal fever; smalipox; scarlet ever; diphtheria; erysipelas; cholera; cerebro-spinal fever; ophthalmia neonatorum; trachoma; acute encephalitis lethargica; polio-encephalitis; acute poliomyelitis; acute primary pneumonia; acute influenzal pneumonia; malaria; dysentery; relapsing fever; trench fever; pulmonary and non-pulmonary tuberculosis. Voluntarily notifiable: measles, whooping-cough, chicken-pox, &c.

INFEFT'MENT, in Scots law, a term used to denote the act of giving symbolical possession of heritable property, the legal evidence of which used to be an instrument of sasine. The instrument of sasine is now obsolete; infeftment is effected by the grantee under a charter or conveyance recording it in the Reg'ster of Sasines.

INFERIORITY COMPLEX, in psychology, feeling of inferiority, manifested by lack of confidence, dissatisfaction with one's achievements, diffidence, &c. It often leads to a reaction or swing in the other direction, the subject assuming a bold, confident, self-satisfied or even pompous demeanour. Some Psycho-analysts derive the inferiority feeling from some actual physical drawback of the subject.

INFERNAL-MACHINE, the expression formerly used to describe an explosive bomb used for any overt act of destruction. In these days the word bomb is more generally used in this connection. The literal meaning of the expression is a bomb intended to be exploded by some mechanical means, and, in the original form, these were the means always adopted. The bomb, filled with the necessary amount of explosive, was provided with a clockwork mechanism which, when wound up and set going, would after a certain interval release a striker arranged to act on a cap of fulminating compound, causing the explosion to follow.

Such machines were not always reliable, and the classes of criminals

given to their use have on occasions themselves suffered from the effects of premature explosions. It would seem that in modern times chemical means of causing the explosion have entirely ousted the original mechanical contrivances.

IN'FINITE and **INFINITES'IMAL**, in mathematics. A variable quantity which increases without limit (q.v.) is *infinite*; a variable quantity the limit of which is zero is *infinitesimal*. 'Infinite' is also used in a slightly different sense in such statements as 'the number of positive integers is infinite,' or 'the number of terms of the exponential series is infinite.' Here the meaning is that, if we select any number we please, there are more positive integers, or more terms of the exponential series, than the selected number. 'Infinitesimal' is sometimes used in the sense of 'exceeding small,' or 'so small that, for the calculation in hand, its square may be neglected.' *See* CALCULUS, THE INFINITESIMAL; LIMIT; NUMBER; GEOMETRY.

INFLAMMA'TION was defined by the late Sir Burdon Sanderson as "the succession of changes which occur in a living tissue when it is injured, providing the injury is not of such a degree as at once to destroy its structure and vitality." The most obvious phenomena are pain, swelling of the affected part, perceptible increase of heat in the patient, and redness beyond the natural degree, often followed by febrile symptoms.

Inflammation, when not excessive, is a beneficent process which serves the purpose of attacking noxious microbes of disease and eliminating them from the system. Inflammations may arise from external injuries, or may be brought on by infective organisms, sudden changes of temperature, &c. The three commonly-described terminations of inflammation are *resolution*, *suppuration*, and *mortification* or *sloughing*.

Resolution is that recovery from the disorder which is effected without the intervention of any disorganizing process, and when the vessels return to their normal condition on the exciting cause of the disorder being withdrawn, and this is the most favourable mode of termination.

If inflammation cannot be resolved, it must go on to *suppuration*, when the skin must either be cut open or break of itself, and there is an escape of a yellow cream-like fluid, after which the symptoms rapidly abate. The tendency to suppuration is marked by the pain becoming full and throbbing, while the pulse becomes more full without being less frequent.

Mortification is accompanied by the sudden cessation of pain, and there is the actual death of the part affected. When the circumstances are favourable, this dead part sloughs off by a vital process known as *ulceration*, and the cavity gradually fills up and heals.

In many cases inflammation may rather be considered as a salutary process than as a disease, for it frequently prevents evils which would occasion either serious or fatal consequences. The most important remedies in cases of severe inflammation are hot fomentations, blisters, and the warm bath, combined with low diet and perfect quietude. As to inflammation of the intestines, *see* ENTERITIS; of the eye, *see* IRITIS; of the bowels, *see* PERITONITIS; of the brain, *see* MENINGITIS; of the lungs, *see* PNEUMONIA.

INFLATION. In monetary theory and banking practice inflation signifies generally an expansion or distention of currency, usually by the printing of paper money. Inflation was understood to have taken place when paper currency was in circulation to a greater amount than could be 'converted' into metallic currency in accordance with the requirements of the Gold Standard system of currency. Inconvertible paper currency is not, however, necessarily a feature of the over-issue of money which is the essence of inflation. In monetary theory the quantity of money in circulation at a given time determines, other conditions being equal, the value of that money in terms of commodities. Inflation, therefore, in the real sense signifies a quantitative expansion of currency in relation to the supply of commodities. Under the Gold Standard system of currency the volume of currency is controlled by the Bank's holdings of gold and inflation can take place only within very narrow limits; but with inconvertible paper currencies a fantastic distention of currency can take place, which becomes visible in a precipitous rise in prices.

Price movements, upwards or downwards, are the main indicator of an inflationary or deflationary movement of currency. Normal expansions of currency and credit (or money-substitutes) which keep pace with the growth of trade and the requirements of exchange do not constitute inflation, but abnormal price movements such as have characterized the whole post-war period, reaching a condition of grave disorder in 1929–33, are symptoms of monetary disequilibrium in relation to commodities.

During the War practically every country suffered from inflation; vast quantities of 'money' were put into circulation, both in the belligerent countries—where the Gold Standard ceased to operate—and in the neutral

countries where a flood of gold brought about a depreciation of currencies in terms of commodities. Depreciated currencies continued to cause trouble after the War, when inflationary Government finance ceased in many countries. In Germany particularly there was from 1920 to 1924 a complete currency collapse, and likewise in Austria; billions of paper marks were required towards the end of the period to buy what *one* mark would purchase in normal times.

From 1920 in Great Britain and certain other countries drastic steps were taken to check inflation and a *deflationary* movement was inaugurated which was assisted by Britain's return to the Gold Standard in 1925, followed by a similar step on the part of other countries. *Deflation*, however, was carried to calamitous lengths and is held by many authorities to be the principal cause of the prolonged downward movement of prices which has had, among other consequences, the effect of compelling an abandonment of the Gold Standard again by many countries and its virtual suspension practically throughout the world at the present time.

In the summer of 1933 a bold policy of *reflation* was inaugurated by the Government of the United States which had the result of initiating an abrupt upward movement of the domestic price level in that country and mild repercussions on world prices generally; but there is considerable dubiety as to the ability of the authorities being able to control the expansion of currency in the United States and preventing a disastrous inflationary cycle there. An important consequence of the present (1933) monetary policy of the United States Government has been the fall of the dollar exchange in terms of foreign currencies. (*See* FOREIGN EXCHANGES)

The post-war behaviour of money —i.e., the phenomena of monetary inflation and deflation, exchange instability, and breakdown of the Gold Standard—has led to much discussion of the idea of a *managed currency* which can be maintained in constant equilibrium with the supply of commodities and the requirements of trade and thus obviate the more violent fluctuations of the price levels and the movement of the trade cycle.—BIBLIOGRAPHY: J. M. Keynes, *A Treatise On Money*, Cassel, *Memorandum on the World's Monetary Problems*, Gibson and Kirkaldy, *British Finance during and after the War*, 1914–1921.

INFLECTION (Lat. *inflexio*, a bending), in grammar, the changes in form which words undergo in consequence of standing in certain relations to other words in a sentence. These changes occur for the most part at the end of words, and the inflectional elements were all probably at first separate vocables. To inflection belong those changes which comprise cases, numbers, persons, tenses, &c. In some languages we have positive proof of inflections being formed of words originally distinct. Thus Fr. *aimerai*, I shall love, the future of *aimer*, to love, is, literally and historically, I have to love, and is compounded of *aimer*, to love, and *ai*, I have, the first person present indicative of *avoir*. The same is the case in Italian and Spanish.

The loss of inflections is a common feature of the Romance tongues as compared with the Latin, on which they are based, and is also a feature of English as compared with Old-English. The result in both cases is much less freedom in the arrangement of words, but this is counterbalanced by greater perspicuity.—Cf. M. Bréal, *Essai de Sémantique*.

INFLORES'CENCE, in botany, the mode of flowering of any species of plant, that is, the manner in which its blossoms are grouped together, and in some cases in which they successively open. The principal forms of inflorescence are the *amentum*, *corymb*, *cyme*, *head* or *capitulum*, *fascicle*, *raceme*, *panicle*, *thyrsus*, *spike*, *whorl*; *centrifugal* and *centripetal* are also terms applied to two types of inflorescence.

INFLUENZA is an acute infective disease presenting varied clinical features, but showing a special tendency to affect the respiratory tract. It appears in world-wide epidemics at irregular intervals, and spreads with great rapidity.

There is some difference of opinion as to the causal germ; but the generally accepted view is that the Bacillus Influenzæ is the primary infective agent, and that other germs are associated with it as secondary invaders.

The incubation period is short, usually two days, but it may vary from a few hours to five days, and the rapid spread of the disease in times of epidemics is due to this short incubation period and to the widespread susceptibility of the population.

In the 1918–9 epidemic, men who had been gassed during the European War were more susceptible, and it is probable that people suffering from catarrhal condition of the nasopharynx and the respiratory tract are likewise more susceptible.

Four different clinical types are recognized:

(1) **Simple Febrile Type.** The onset is abrupt, beginning with severe pain in the back, head, and limbs, and with

a feeling of chilliness and general lassitude. The temperature rises rapidly and the tongue is thickly furred. Sore throat is complained of, and there is frequently a dry, irritating cough. Many patients sleep heavily and desire to remain undisturbed, while others are restless and sleepless. The fever disappears in three or four days, and the patient is left weak and listless for some time afterwards. The simple febrile form may, however, develop into one of the more severe types, and even the slightest case should be watched at first with care.

(2) **The Severe Respiratory Type.** The disease in this type begins with the same symptoms of fever, pain, and prostration, but the cough and respiratory distress soon become more marked. Pain in the front of the chest is complained of, while the cough is very severe and irritating, becoming paroxysmal and causing considerable exhaustion. Bronchitis may be present, and the condition may spread to the smaller tubes and cause bronchopneumonia.

In this type of influenza the early appearance of cyanosis (blueness) of the face is a very serious sign, and it has been observed that when cyanosis appeared as early as the second day, the result was nearly always the death of the patient. The acute symptoms in this type of influenza last from two to three weeks, and when recovery takes place, it may be slow with a long convalescence. Occasionally very severe cases are seen in which death occurs within thirty hours of the onset.

(3) **The Abdominal Type.** In this form of the disease, as well as the head and back pain with prostration there is severe abdominal pain with vomiting and occasionally diarrhœa. There is complete loss of appetite, and a markedly furred tongue with fœtid breath. In the early stages these latter symptoms may be so severe that the condition may be confused with abdominal trouble requiring surgical interference.

(4) **The Cerebral or Nervous Type.** In this type the headache, pain in the back, and prostration are the prominent symptoms, with persistent insomnia and at times delirium. Convalescence is often retarded by mental exhaustion, and neuralgia in various forms may appear. When unchecked, this mental depression may become melancholic.

The chief complications which may arise in influenza are: deafness, with disease of the middle ear; pleurisy; dilation of the heart and other heart disorders; epistaxis and, less frequently, hæmorrhage from the lung, bowel, or bladder; nephritis; parotitis; while various rashes may be seen. An attack of influenza may light up latent pulmonary tuberculosis, or it may be the onset of that disease.

The severity of influenza varies with the different epidemics, and the death-rate was much higher in the 1918–9 epidemic than in the 1921–2 outbreak. Relapses and re-infection are common, as the immunity from an attack is short.

In the treatment complete rest in bed in all cases is to be advised, and the patient should not get up for at least three days after the temperature is normal and the chest signs have disappeared. Wherever possible, the patient should be isolated and suitable nursing provided, while the diet should be restricted to fluids.

Sleep should be obtained, if possible, in all restless cases, though opium is to be used with great care wherever chest symptoms are prominent. Warmth to the chest in some form is indicated to relieve the tightness and discomfort, and many drugs are used for the relief of the back pains with varying results.

Vaccines are of use as a preventive measure in epidemics, and these have considerable effect in lessening outbreaks in large communities, as schools, colleges, and institutions. Further prevention should be aimed at during epidemics by the use of disinfectant gargles and nose-washes.

INFORMATION (*informare*, to sketch, to give shape to, to describe, represent), in English law, a term used in several senses. In criminal law, an information, filed by the Attorney-General, is a substitute for an ordinary indictment, and is resorted to only in such cases of misdemeanour as tend to disturb the peace or the government; e.g. libels on judges, magistrates, or public officers, or bribery at elections. An information in Chancery is a suit on behalf of the Crown as to any misapplication of a public charity, or on behalf of an idiot or lunatic.

An information in the Exchequer is to receive money due to the Crown, or to receive damages for an intrusion upon Crown property. The term also denotes a written statement made on oath before a justice of the peace previous to the issuing of a summons or complaint against a person.

INFORMATION, MINISTRY OF, a department of the British Government, established during the European War for the purpose of acquainting the world with British war-aims and counteracting the enemy's efforts in neutral countries. At first the work was under the control of the Foreign Office, but in 1916 a special depart-

ment was set up. In 1918 the department became a ministry, and Lord Beaverbrook was appointed Minister of Information. The ministry ceased to exist after the armistice, i.e. towards the end of 1918.

INFORMER, the person who prosecutes those who have infringed any law or penal statute. To encourage the apprehending of certain felons, guilty of offences not so much criminal as bordering on criminality, many English statutes, from 1692 and downwards, granted rewards to such as should prosecute to conviction; and this practice has been resorted to frequently in modern statutes.

In Scotland the informer is a party who sets the Lord Advocate in motion in criminal prosecutions. The early legislation on this point gave rise to the most flagrant abuses, and police officers made a trade of seducing poor, ignorant persons to crimes, especially the issuing of counterfeit money, to gain the reward.

The informer, no doubt, advances the cause of the law and justice and serves the interests of society, but he is nevertheless a despised and hated creature. More often than not he acts as informer for the pecuniary reward offered and not for the promotion of the welfare of society.

Informers or delators existed in Ancient Greece, where they were known as Sycophantes, and in Imperial Rome, where they flourished exceedingly. Political informers were numerous in Russia from the reign of Peter the Great to 1917.

INFUSORIA, a large group of minute, mostly microscopic, animals, so named from being frequently developed in organic infusions, provisionally regarded as the highest subdivision of the Protozoa. They are provided with a mouth, except in certain parasitic forms, are destitute of pseudopodia, but are furnished with vibratile cilia during part of all of their existence.

Most are free-swimming, but some form colonies by budding, and are fixed to a solid object in their adult condition. The body consists of an outer transparent cuticle, a layer of firm protoplasm called the cortical layer or ectosarc, and a central mass of semiliquid protoplasm (endosarc). Contractions of the body are effected by fibrils in the ectosarc. The cilia are not only organs of locomotion, but form currents by which food is carried into the mouth.

A large nucleus (meganucleus) and a small one (micronucleus) are present, the latter playing an important part in reproduction, which is typically by fission. In many cases temporary or permanent fusion (conjugation) takes place, and this is followed by active fission. Under unfavourable conditions, infusoria may pass into a resting or encysted stage, the body contracting into a rounded mass and forming a firm investment.

They are divided into two groups, Ciliata and Suctoria. The former may be free-swimming, as the slipper animalcule (Paramœcium), or fixed as in the case of the bell animalcule (Vorticella. The Suctoria are parasitic, and suck the juices of other Protozoa or of the Crustacea by means of peculiar tentacles.

INGE, William Ralph, British theologian, born 6th June, 1860, at Crayke, Yorkshire. Educated at Eton and at King's College, Cambridge, where he had a brilliant career, he was a master at Eton from 1884 to 1888, and from 1889 to 1904 Fellow and tutor of Hertford College, Oxford. He was vicar of All Saints', Ennismore Gardens, London, from 1905 to 1907, when he was appointed Lady Margaret professor of divinity at Cambridge.

In 1911 he came again to London as Dean of St. Paul's Cathedral, where he distinguished himself by his views and utterances on social questions. He retired in 1933. His works include: *Society in Rome under the Cæsars* (1886), *Christian Mysticism* (1899), *Truth and Falsehood in Religion* (1906), *Personal Idealism and Mysticism* (1907), *Speculum Animæ* (1911), *The Church and the Age* (1912), *Outspoken Essays* (1919), *Lay thoughts of a Dean,* and *More Lay thoughts of a Dean* (1931). His most important book is *The Philosophy of Plotinus.*

INGELOW (in'je-lō), **Jean,** English poet, was born in 1820, died in 1897. In 1863 she published a volume of poems, which ran through fourteen editions in five years, and her popularity subsequently increased both through her prose writings and her poetry. In prose she wrote novels and ta for children, including *Mopsa the Fairy, Studies for Stories, Off the Skelligs, Sarah de Berenger,* and *Don John.*

INGERSOLL, town and river port of Ontario, on the Thames, 19 miles from London, on the C.P. and C.N. Rlys. There is a harbour, and the town has some manufactures. Pop. 5,150.

INGLEBOROUGH, hill in Yorkshire, about 3 miles from Settle in the N.W. of the county, and 2,373 feet high. On it are remains of a fort and in it is Ingleborough Cave containing stalagmites and stalactites.

INGLETON, market town of Yorkshire (W.R.), 10 miles from Settle

and 243¾ from London on the L.M.S. Rly. Pop. 2,464.

INGOLSTADT (ing'ol-stât), a fortified town of Bavaria, on the Danube, 35 miles S.W. of Ratisbon. It has an old and a new castle, a fine old Gothic church, and a Jesuit college; before the end of the European War there was a considerable manufacture of ordnance and gunpower. Ingolstadt had a university of some celebrity, founded in 1472, but in 1800 it was removed to Landshut and in 1826 to Munich. Pop. (1925), 26,630.

INGOT (ing'got), a small bar of metal made of a certain form and size by casting it in moulds. The term is chiefly applied to the small masses or bars of gold and silver intended either for coining or exportation to foreign countries.

INGRAM, A. F. Winnington. English divine, born in Worcestershire in 1858 and educated at Marlborough College, and Keble College, Oxford. Beginning with a curacy at St. Mary's, Shrewsbury, in 1884 he became private chaplain to the Bishop of Lichfield and in 1889 head of the Oxford House, Bethnal Green. He was appointed suffragan bishop of Stepney in 1897 and in 1901 was created Bishop of London, after the death of Dr. Mandell Creighton. During the World War he did much to provide religious instruction for the fighting men and visited both the French front and the Grand Fleet. He also took a prominent part in the discussions on the proposals for the revision of the Prayer Book.

INGRAM, Rex, film producer. He was born in Dublin, 15th Jan., 1892. Going to the United States, he worked there as a sculptor and an actor, afterwards becoming connected with the film industry. His productions include *The Garden of Allah* and *The Four Horsemen of the Apocalypse.*

INGRES (an-gr), **Jean Dominique Auguste,** French painter, born in 1780 at Montauban, died in Paris 1867. He first studied under David, and in 1806 went to Rome, where he resided for fifteen years. After a further residence of four years in Florence he returned to Paris and opened an atelier for students, his fame being by this time fully established. In 1834 he succeeded Horace Vernet as director of the French Academy at Rome.

In the same year he was nominated Chevalier, and in 1845 Commander of the Legion of Honour. In 1855 he received the grand medal of honour at the International Exhibition, and in 1862 he was made a Senator and member of the Council of Public Instruction. Ingres was the recognized leader of the Classic as opposed to the Romantic painters of his time. A passionate admirer of Raphael and Classical antiquity, as a draughtsman and designer he is in the front rank, though his colour is dull and insipid.

Among his best-known works are *Bonaparte as First Consul, Œdipus and the Sphinx, Apotheosis of Homer, Birth of Venus, Virgil Reading his Æneid to Augustus, The Source, An Odalisque,* and a remarkable series of portraits, especially of women. His influence on modern painting has been considerable. He is best represented in the Louvre, but can also be seen in the National and Tate Galleries.

INHABITED HOUSE DUTY, in Great Britain a tax on inhabited

Jean Dominique Auguste Ingres

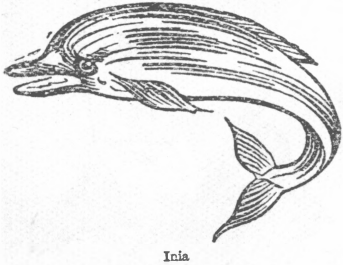
'houses' worth £20 and upwards annual value. The rates charged per £1 were, for shops, inns, and farmhouses, 2*d.* up to £40, thereafter 4*d.* up to £60, and 6*d.* above £60, while for other houses the rates within the same limits of value were respectively 3*d.*, 6*d.*, and 9*d.* A house occupied only by a caretaker was exempt. The tax was abolished in 1924.

INHALER, an apparatus for inhaling vapours and volatile substances, as steam, vapour of chloroform, iodine, &c. A commonly used type of inhaler consists of a tin can containing a small spirit-lamp, and above this a small kettle for hot water, the steam of which is driven out with some force when the apparatus is used. Attached to the can is a receptacle for receiving a small phial containing the substance whose vapour is to be inhaled, this being drawn off and forced through the funnel by the steam.

INHAMBANE (ĭn-yăm-bā′ne), a Portuguese town and seaport on the east coast of S. Mozambique or Portuguese East Africa. Pop. 20,000.—The coastal district has an area of about 33,000 sq. miles, and a population of 750,000.

INHIBITION, in Scots law, is a writ issued to prohibit a person from burdening or alienating his real estate till the debt of the creditor is paid. In ecclesiastical law it is an order of a bishop prohibiting a clergyman from discharging any duty of his office. In psychology it is applied to the repression of an impulse, &c., which, from its nature, is repugnant to the conscious mind. Many primitive urges are thus inhibited. Inhibition may not be complete, and the energy is then displaced on to some associated mental process not unacceptable to consciousness.

IN'IA, a genus of Cetacea belonging to the dolphin family, containing only



Inia

one known species, *I. geoffroyensis*, remarkable for the distance at which it is found from the sea, frequenting the remote tributaries of the River Amazon, and even some of the elevated lakes of Peru, particularly Titicaca. It has bristly hairs on its snout, and is from 7 to 12 or 14 feet long.

INJECTOR, a device in which the kinetic energy of steam issuing from a jet is used to set another fluid in motion. One of its main uses is to feed water into a boiler. In the Penberthy type of injector the steam enters through the top nozzle, and its first action is to exhaust any air present. Once the suction of water is established, through the condensation of the steam, the mixture of feed water and condensing steam passes through the bottom jet with a considerable velocity.

This jet has a gradually enlarged passage to its end in order to transform part of the kinetic energy of the moving water to pressure energy, and the pressure produced is sufficient to enable the steam to open the clack valve and flow into the boiler. The major part of the heat contents of the steam used is returned to the boiler in the feed water.

INJUNCTION, in English law, most commonly a prohibitory writ, issuing from any of the divisions of the High Court of Justice, restraining a person from doing some act which appears to be against equity, and the commission of which is not punishable by criminal law. It is either *provisional*, until the coming in of the defendant's answer, or *perpetual*, that is, perpetually restraining the defendant from the commission of an act contrary to equity.

Disobedience to an injunction constitutes contempt of court, and is punishable accordingly. In Scots law the corresponding term to 'prohibitory' or 'preventive' injunction is *interdict*. Very occasionally the court will issue a 'mandatory' injunction, enjoining that something be done.

INK-BAG, or **INK-SAC,** a bladder-shaped sac found in some dibranchiate cephalopods, as the calamaries or squids, and containing a black viscid fluid resembling ink. This fluid is to some extent used for drawing, under the name of sepia.

INKERMAN, a town of Russia, government of Taurida, in the Crimea, at the head of Sebastopol harbour. It is famous for the signal victory of the Allies over the Russians in the Crimean War, 5th Nov., 1854.

INKPEN, village of Berkshire. In the neighbourhood is Inkpen Beacon, the highest point of the Berkshire Downs. It rises to a height of 959 ft. at Walbury Hill. The village is 4 miles from Hungerford. Pop. 660.

INKS are materials used for producing permanent records on paper and other substances. They are either fluid, as in the case of writing-inks, or in the form of pastes when used for printing. The earliest use of a liquid which can be described as ink is found on papyrus documents dating from 2,500 B.C. The basis of the ink consisted of charcoal ground up with gum solution, oil, or varnish.

At a later date the black secretion of the cuttle-fish or sepia was used by the Romans, but it was not until the eleventh century that inks of the iron-gall type, which form the basis of most writing-inks of the present time, were used.

The transition from carbon and sepia inks to those of the iron-gall type was a very gradual one, and it is noticeable that manuscripts in which the former types of ink were used are

as a rule more legible than those written with the latter kind. This is partly to be ascribed to the lack of knowledge regarding the correct proportions of the ingredients used in its preparation. The following are the chief types of inks at present used, together with their composition and characteristics.

Blue-black and **black inks** form the most important class of writing-inks. They consist essentially of a decoction of gall-nuts or other tannin-yielding substances mixed with an iron salt such as copperas (ferrous sulphate). Writing with such a fluid is of a pale bluish-grey colour, and gradually turns black on exposure to the air, due to the oxidation of the soluble bluish substance to an insoluble black compound which cannot be removed from the paper by washing.

In order to obviate the initial paleness of the writing, provisional colouring-matters such as logwood extract or aniline dyes are added to the ink. The following formula gives a typical ink of this nature: 1 lb. of ground Chinese or Aleppo galls is boiled with 3 pints of water, and the extract treated with 3 oz. of copperas and the same quantity of gum arabic dissolved in 1 pint of water; soluble indigo is then added as provisional colouring-matter, and also a small quantity of phenol (carbolic acid) to prevent fermentation. After standing for some days the ink is decanted and is ready for use. Gallic acid and logwood extracts are also largely used in the preparation of blue-black and black inks.

Red inks. Ordinary red ink consists of a 1 per cent solution of eosine in water, together with a small quantity of an antiseptic to prevent the formation of mould. Other aniline dyes, such as cotton scarlet, ponceau scarlet, &c., are also suitable. Before the discovery of aniline dyes red inks were prepared from cochineal and from Brazil wood, but these inks are more fugitive to light than those made from synthetic dye-stuffs.

Green inks are prepared from aniline dyes such as malachite green, or from a mixture of soluble indigo and a yellow dye.

Violet inks are made from the synthetic dye-stuff methyl violet, 1 part being dissolved in 300 parts of water.

Blue inks consist of a solution of soluble indigo, or of some other blue dye which possesses a sufficient degree of fastness to light.

Copying-inks are prepared by the addition of sugar, glycerine, gum, or dextrine to an ordinary writing-ink. These materials prevent the complete penetration of the ink into the paper. On placing a damp sheet of tissue-paper over the writing and submitting it to pressure, part of the ink is transferred on to the copying-sheet.

Marking-inks. The juice of certain plants such as the ink plant, cashew nut, and various forms of sumach can be used for the indelible marking of linen, but the majority of modern marking-inks contain a silver salt as a basis. A satisfactory recipe is as follows: 2 parts of silver nitrate are dissolved in 4 parts of water; a strong solution of ammonia is added until the precipitate first formed just redissolves; 1 part of gum is then added. The ink is used with a quill pen, and rendered permanent by exposure to light or by passing a moderately hot iron over the writing. The black characters thus formed consist of metallic silver, and are not removed by washing.

Rubber-stamp inks are made by dissolving aniline dyes of various shades in a mixture of water and glycerine, the latter preventing the ink from drying on the stamping-pad.

Indian or Chinese ink is of extreme antiquity, and is still largely used in the East for writing purposes, and also by artists for black-and-white work. It consists essentially of finely-divided carbon suspended in a solution of gum, glue, or varnish. The finest variety is prepared from the soot formed when sesame oil or tung oil is burned with an insufficient supply of air. The soot is collected, thoroughly mixed with glue, moulded into sticks, and dried. A good quality Indian ink should give a uniform liquid free from coarse particles or flakes when rubbed with water.

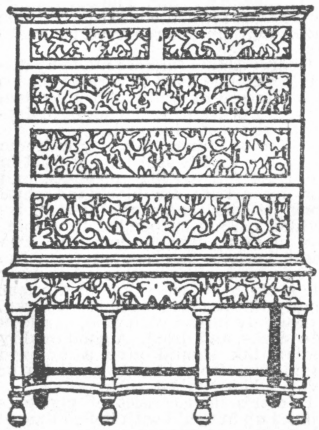
Printer's inks consist of pigments ground up in a mill with boiled linseed oil, resin, and soap, the latter facilitating the separation of the paper from the type. The proportions and nature of the ingredients used vary according to the nature of the work, an ink suitable for printing a newspaper in a high-speed rotary press being quite unsuitable as a lithographic ink.

For black printing-inks lamp-black is used as a pigment, a small quantity of indigo being added to improve the shade. For coloured inks, vermilion, ultramarine, chrome green, chrome yellow, burnt ochre, lead white, and various other pigments are used, and also certain aniline dyes which are fast to light.

Secret or **invisible inks** are solutions of various substances which are used on paper in the same manner as ordinary inks. Such writing is invisible until heated, or treated with the appropriate reagent. Thus writing in a dilute solution of cobalt chloride is colourless, but on heating the paper

the characters appear in blue, fading again on exposure to the air. Milk, lemon juice, a solution of alum, &c., can also be used as secret inks, the writing being readily revealed by the application of a hot iron, the ink charring at a lower temperature than the paper.

Other secret inks depend for their development on a definite reaction between the ink and the developer, which gives rise to a coloured substance. Thus writing in starch can be revealed by means of iodine, and sugar of lead by sulphuretted hydrogen. During the European War secret inks were largely used by spies.—BIBLIOGRAPHY: S. Lehner, *Ink Manufacture*; C. A. Mitchell and T. C. Hepworth, *Inks: their Composition and Manufacture*; Sir E. Thorpe, *Dictionary of Applied Chemistry*.



Inlaid furniture, 17th century piece

INLAYING is the art of inserting any piece of hard material into the surface of a different hard material, or into the surface of a piece of the same material, differently coloured, so as to form a decorative pattern or design. There are several varieties of inlaid work, the chief of which are *wood*, *ivory*, or *shell*; *marble* or *stone*; and *metal*.

There are two methods of carrying out **wood inlay** or **marquetry** (from the Fr. *marqueterie*): (*a*) the ancient method of cutting shallow hollows in a solid base of wood, according to a prearranged design, and filling up the hollows with pieces of natural or stained wood, shell, or other material. (*b*) The more modern method of cutting the same design on several panels of thin wood of different colours, placed one on top of the other, and subsequently fitting the pieces cut out of a panel of one colour into the space left in a panel of another colour, finally cementing the inlaid veneer thus obtained to the piece of furniture for which it has been planned.

Some of the chief veneers used in marquetry are satin-wood, tulip-wood, rose-wood, pear tree, Thuya burr, and ebony. Holly, stained black, is a substitute for ebony.

Early examples (eighth and tenth centuries B.C.) of Assyrian and Egyptian inlaid patterns of metal and ivory on wood are to be seen in the Louvre and the British Museum. The art of inlay or intarsia flourished in Italy in the fifteenth and sixteenth centuries. Dutch marquetry of the late sixteenth and early seventeenth centuries is famous. Wood inlay of good quality was produced in England in the sixteenth century.

Examples of inlaid furniture may be seen at South Kensington Museum, London. The Japanese excel in inlaying polished wood with carved mother-of-pearl, tortoise-shell, stained ivory, and gold. Boulle or Buhl work was invented in Paris, 1672, by André Charles Boulle. It consists of wood or tortoise-shell richly inlaid with brass.

Marble or stone inlay is a decoration more suitable for covering large surfaces. A pure example of marble inlay is to be seen at the Taj Mahal, Agra, India.

Metal inlay. In Niello work, fine lines graved in metal are filled in with a dark metallic amalgam composed of silver, copper, lead, and sulphur.

Many examples of *damascene* work originated by the goldsmiths of Damascus, and carried on to the present day in Spain and Persia, are to be found in India and Japan. It is the art of encrusting gold or silver wire on iron, steel, or bronze. In India it is known as Kuft work. Damascening in silver is known as Bidri (from Bider in the Nizam's dominion, India). On a metallic ground, blackened by a solution of sal ammoniac, saltpetre, and blue vitriol the required pattern is graved; the graven lines are then inlaid with silver.—BIBLIOGRAPHY: F. Hamilton Jackson, *Intarsia and Marquetry*; Charles J. Lock, *Marquetry*.

INMAN, William. English shipowner, born at Leicester, 6th April, 1825, he was educated in Liverpool and entered business there. In 1849 he became a partner in a firm of merchants and in 1850 a ship-owner. He founded the Inman line, and died 3rd July, 1881.

INN, a river of Europe which issues

from a lake in Switzerland at the foot of the Rhætian Alps, traverses the valley of the Engadine, flows through Tyrol and Bavaria, and joins the Danube at Passau, after a course of about 310 miles.

INN, a house where travellers are furnished, for the profit of the provider, with everything they have occasion for whilst on their journey. Inns may be set up without licence by any person, provided he refrains from selling excisable liquors, which of course require a licence. Public-houses, taverns, victualling-houses, and coffee-houses are all inns when the keepers of them make it their business to furnish travellers with food and lodging; otherwise they are not.

From the Elizabethan period down to the eighteenth century the inns in Great Britain were the meeting-places of poets, writers, and wits. The most famous of such inns and taverns were: The Tabard, in Southwark, well known through Chaucer's *Canterbury Tales*; The Mermaid, in Bread Street, frequented by Shakespeare and Ben Jonson; The Devil Tavern, near Temple Bar; The Boar's Head, in East Cheap, connected with Sir John Falstaff and Mistress Quickly; The Mitre, in Fleet Street, frequented by Dr. Johnson; and many others. *See also* INNS OF COURT.—BIBLIOGRAPHY: F. W. Hackwood, *Inns, Ales, and Drinking Customs of Old England*; H. P. Maskell and E. V. Gregory, *Old Country Inns of England.*

INNATE IDEAS, certain primary notions or impressions, supposed by some philosophers to be given to the mind of man when it first receives its being, and to be brought into the world with it. Descartes distinguished ideas into *innate, adventitious,* and *factitious.* An innate idea he described as not one that presents itself always to our thought, for there could be no such idea; but one that we have within ourselves the faculty of producing. He did not enumerate such ideas, however. What the followers of Descartes signate as *innate ideas,* those of Locke term *universal, necessary,* and *absolute.* Kant advocated not innate but a priori conceptions.

INNERLEITHEN, a burgh of Scotland, county of Peebles, 6½ miles E.S.E. Peebles, on the Leithen, and near the Tweed. Woollen goods are manufactured. The town has a mineral spring and pump room. It is the 'St. Ronan's Well' of Scott. Pop. (1931), 1,559.

INNKEEPER. An innkeeper is one who, for profit, keeps a house where travellers may obtain lodging and refreshment. He cannot legally refuse to receive any traveller who conducts himself properly, is free from infectious disease, and willing to pay a reasonable charge, and for whom there is accommodation. But he is not obliged to keep a traveller indefinitely, and if the character of traveller is lost by prolonged stay, such a guest may be ejected after reasonable notice.

An innkeeper is responsible at common law for loss of and injury to the property of a guest not caused by the guest himself or his servant or by inevitable accident. But by the Innkeepers Act, 1863, this liability is limited to £30, unless (1) the property is a horse or other animal, or the gear, or a carriage; (2) the loss or injury was caused by the fault of the innkeeper or his servant; and (3) the property was deposited with the innkeeper for safe custody.

The person of a guest cannot be detained for payment of the bill, but there is a lien over his property, and if he leaves without paying, the innkeeper may, after six weeks, advertize the property, in a London newspaper and one circulating locally, for sale by public auction, and after a further month proceed to sell and take payment of his bill and costs. *See* LICENCE.

INNOCENT, the name of thirteen Popes, of whom only the following need be particularly dealt with.—**Innocent I** succeeded Anastasius I as Bishop of Rome in A.D. 402. He supported St. Chrysostom, and renounced communion with the Eastern Churches on that account. In 409 he was sent to obtain terms of peace from Alaric, but without success. He died in 417, and is one of the most distinguished saints, his day being 28th July.

Innocent II, a Roman of noble birth, elected Pope in 1130 by a part of the cardinals, whilst the others elected Peter of Leon, who took the name of Anacletus. Innocent fled to France, where he was acknowledged by Louis VI and by Henry II of England; also by the Emperor Lothaire, who conducted him in 1133 to Rome, where Anacletus also maintained his claims as Pope. Innocent was obliged to retire, and though reinstated in 1137, Anacletus maintained himself until his death in 1138. Innocent in 1139 held the second Œcumenical Council in the Lateran, which condemned the opinions of Arnold of Brescia, and declared the decrees of Anacletus null. Innocent died in 1143.

Innocent III, Lothario, Count of Segni, born in 1161, was unanimously elected Pope at the age of thirty-seven. He displayed great energy, and much enhanced the Papal power. He

excommunicated Philip Augustus, King of France, and laid his kingdom under an interdict in 1200 because Philip had repudiated his wife, and obliged the king to submit. He extorted a similar submission from

Pope Innocent, III

John, King of England, who refused to confirm the election of Langton as Archbishop of Canterbury, by laying the kingdom under an interdict, and in 1212 formally deposing him.

Almost all Christendom was now subject to the Pope, two Crusades were undertaken at his order, and his influence extended even to Constantinople. The cruel persecution of the Albigenses and the establishment in 1198 of the inquisitorial tribunals, from which the Inquisition itself originated, were noteworthy events of his pontificate.

In 1215 he held a council by which transubstantiation and auricular confession were established as dogmas, and the Franciscan and Dominican orders were confirmed. Innocent died in 1216. He left various works on legal and theological subjects; and the *Stabat Mater*, *Veni Sancte Spiritus*, and other sacred hymns are said to have been written by him.

Innocent XI, Benedetto Odescalchi, born in 1611, served in his youth as a soldier, took orders at a later period, and rose through many important posts, until he was elected Pope in 1676, on the death of Clement X. He was eminent for probity and austerity. Though hostile to the Jesuits, whose opinions he attacked in the decree *Super quibusdam axiomatis moralibus*, yet he was obliged to condemn Molinus and the Quietists. Being involved in a dispute with Louis XIV, the authority of the Pope in France and elsewhere received a severe blow in the *IV Propositiones Cleri Gallicani* (Four Propositions of the Gallican Clergy, 1682). These disputes were highly favourable to the English Revolution, as they induced the Pope in 1689 to unite with the allies against James II, in order to lower the influence of Louis XIV. He died in 1689, and was succeeded by Alexander VIII.—BIBLIOGRAPHY: L. Pastor, *History of the Popes*; F. Gregorovius, *Rome in the Middle Ages*.

INNOCENTS, FEAST OF HOLY, variously styled Innocents' Day and Childermas, a festival observed in the Western Church (including the Anglican) on the 28th Dec., and in the Eastern Church on the 29th Dec., in commemoration of the massacre of the children at Bethlehem by the order of Herod.

INNSBRUCK, a town of Austria, capital of the Tyrol, beautifully situated on the Inn, near the confluence of the Sill, surrounded by striking groups of lofty mountains. It is a popular tourist resort. Among the chief buildings are the Hofkirche or Franciscan church, containing the splendid tomb of the Emperor Maximilian I and the tomb of Andreas Hofer; the church of St. James; the castle or palace; the Golden Roof, a sort of oriel window roofed with gilt

Innsbrunk. View along the chief street

copper, and projecting in front of a building originally a palace of Count Frederick of Tyrol; the town house; the Capuchin monastery; the university, founded in 1672; and the Ferdinand museum. Near the town was a Roman station. It has a broadcasting station (283M.; 0·5 k.w.). Pop. (1930), 56,401.

INNS OF CHANCERY, in London, nine institutions named Thavies Inn, New Inn, Symonds Inn, Clement's Inn, Clifford's Inn, Staple Inn, Lyon's Inn, Furnival's Inn, and Barnard's Inn, which formerly existed as preparatory colleges for law students.

INNS OF COURT, four very ancient societies in London exclusively invested with the right to call men and women to the English Bar; also the buildings belonging to these societies, in which the members dine and barristers have chambers. The members belonging to these societies may be divided into benchers, inner barristers, utter barristers, and students. The benchers are the highest in rank, being usually King's Counsel; and it is they who have the right of granting or refusing a call to the Bar, or of disbarring persons unfit to practise.

The four inns of court are the Inner Temple and Middle Temple (formerly the dwelling of the Knights Templars, and purchased by some professors of law more than five centuries ago); Lincoln's Inn and Gray's Inn. Each inn is self-governing, and all have equal privileges. In each inn building there is a hall, chapel, and library, besides sets of chambers occupied by barristers and solicitors. In Dublin there is an inn of court called the King's Inn, and one has existed since 1922 for North Ireland at Belfast. In Scotland a similar work is performed by the Faculty of Advocates.

Previously to being called to the Bar it is necessary to be admitted a member of one of the inns of court and to go through a certain course of legal study and 'keeping terms.' Any person who has passed a public examination at any university in the British dominions may be at once admitted as a student to any of the inns. Every other person must pass an examination in the English and Latin languages and English history before a joint board appointed by the four inns. No solicitor, parliamentary agent, clerk to justice of the peace, or to any barrister, conveyancer, solicitor, &c., can be admitted as a student until such person ceases to act in any of these capacities and has taken his name off the roll of any court on which it may stand.

The educational year is divided into four terms. Attendance is not compulsory on students either at lectures or private classes; nor is it essential to study the practice of law in the chambers of a barrister or pleader, though this is recommended. A term is kept by the student being present at six dinners during the term in the hall of the society to which he belongs, or three if he is a member of one of the British universities.

Students are required to pass an examination in Jurisprudence, Roman Civil Law, Constitutional Law and Legal History, the Law of Real and Personal Property, Common Law, Equity, and Criminal Law, there being four examinations in each year. The Sex Disqualification (Removal) Act, 1919, legalized the admission of women.—BIBLIOGRAPHY: C. Headlam, *The Inns of Court*; T. Cunningham, *History and Antiquities of the Four Inns of Court and of the Nine Inns of Chancery*; W. J. Loftie, *The Inns of Court.*

INNUEN'DO (Lat. *innuere*, to hint), in actions of libel and slander, the defamatory meaning attributed by the plaintiff to the words of which he complains. They 'hint' at or imply something derogatory.

INOCULATION, in medicine, the artificial setting up of a mild attack of a disease to render the individual insusceptible to natural infection. The principle was first widely applied in small-pox, being based on knowledge acquired by Lady Mary Montagu in Turkey. Here matter from a small-pox patient, when rubbed into a scratch on the skin, was shown to originate an illness much less severe than ordinary small-pox. Though equal immunity against the disease was thus secured, the method was superseded by Jennerian vaccination. Since the bacteriological epoch the principle has been widely taken advantage of.

Pasteur used weakened cultures of anthrax to protect cattle against the disease, and his preventive treatment for hydrophobia in cases of persons bitten by mad dogs rests on a similar basis. Here the disease does not develop until about forty days after the bite, and Pasteur used this interval to accustom the body to meet the threatened attack by injecting small doses of weakened virus obtained by drying the spinal cords of infected rabbits.

Preventive inoculation against typhoid fever by the use of killed typhoid bacilli has markedly reduced the incidence of the disease in armies, and good results have been obtained by similar means in the pneumonia so prevalent in the South African mines.

Even if disease is established, its course can be modified by inoculation. Thus, in a person suffering from boils, the injection of dead cultures of the causal bacterium prevents new boils forming. Such vaccines, as they are often called, have been used for the prevention of recurring colds, bronchitis, &c. A certain amount of success has also attended the treatment of local tuberculosis with ex-

tracts of the tubercle bacillus (tuberculins).

INORGANIC CHEMISTRY, name given to the study of the properties and constitution of elements and compounds other than those of carbon. It is not easy to draw a sharp line between inorganic and physical chemistry.

Since the development of this more modern branch of the science many new theories have been introduced, and the structure of the more complex inorganic substances investigated. The idea of the atom as the smallest particle of elementary matter, although still a useful basis for the study of elementary chemistry, has to be abandoned, and it now appears that the atom of Dalton is an aggregation of particles or electrons, and not one single particle. Radio-chemistry has done much to advance research into the structure of the atom.

Most of the views advanced on the structure of the atom are based on physical evidence, but some attempts have been made based on chemical considerations. For example, Lewis regards the atom of an element as built up of a central nucleus carrying a positive charge of electricity and surrounded by a shell of negative electrons. The nucleus is not affected by chemical reactions, and possesses an excess of positive charge equal to the number of the group to which the element belongs in the periodic table. The number of negative electrons in the shell may vary from 0 to 8. It is the shell which takes part in chemical change, and the number of electrons and the valence of the element are associated.

The great variety of hypotheses dealing with the constitution of the atom has not established a definite valence hypothesis which will enable the chemist to present a more complete idea of the relationship between chemical constitution of a substance and its chemical and physical properties. Most of the valence theories formulated fit in well when dealing with simple chemical compounds, but when more complex compounds are studied, there are as many exceptions as there are substances obeying that particular theory; the subject of valence may therefore be regarded as in a transition stage.

The development of organic chemical constitution based on the quadrivalence of carbon suggested that the constitution of other complex substances might be worked out in the same way, but so far this has not been realized.

A new view has to be taken of the chemical elements since the discovery of radium and the radio-elements. About 80 elements were known, each distinguished by definite chemical properties and a definite atomic weight, and no one element could be transformed into any other element. The study of the radio-elements revived the old idea of transmutation of elements, but in a new form. Among the radio-elements change is going on; thus radium loses α- and β-particles, and thus becomes transformed into other radio-elements. So although transmutation of metals as attempted by the alchemists is still unaccomplished, in certain series of elements transmutation does take place. (*See* RADIO-ACTIVITY.)

Each element has assigned to it a definite atomic weight, i.e. its relative weight compared with a standard. In 1910 attention was called to the fact that certain of the radio-elements were identical in chemical behaviour, and could only be distinguished by their radio-active constants, and when their atomic weights were determined these were found to be different. For example, ionium, radio-thorium, and thorium cannot be distinguished by chemical means, and yet their atomic weights are: ionium=230, radio-thorium=228, thorium=232; thus showing that elements may have the same chemical properties and yet differ in atomic weight and radio-active constants.

This led to the conclusion that chemical analysis may separate matter into types of matter and not into elements. These types, although chemically identical, may be found to be made up of more than one element when examined by other methods. Soddy gives the name *isotopes* (q.v.) to these apparently identical elements. Owing to research in this direction, the atomic weight of lead derived from various sources has been determined, and is found to vary by several units. Ordinary lead may be regarded, therefore, as possibly a mixture of two or more isotopes. The view has been suggested that wherever the atomic weight of an element is not a whole number, it may represent the mean atomic weight of a mixture of chemically similar elements.

The so-called 'rare earths' take an important part in modern inorganic chemistry. These were only known at first in minute quantities, but in recent years have been proved to be widely distributed, and can be obtained in sufficient quantity to render them of practical importance; the name 'rare earths' can hardly be applied to these now.

The rare earths are made up of a series of basic oxides divided into three groups; the cerium group, the terbium group, and the ytterbium

group all show a close resemblance. The place of these elements in the periodic classification is a much disputed point, and has not as yet been satisfactorily settled.

In 1884 Welsbach took out a patent which was the fore-runner of the incandescent-mantle industry. That date marks the beginning of the practical importance of the rare earths. At that time the deposits of these 'earths' known were very limited, but soon afterwards large deposits of monazite sand were discovered in Brazil and Carolina, and, later, thorianite in Ceylon. These discoveries made it possible to obtain the earths cheaply. Cerium and thorium salts are the earths used for the industry, and their use depends on the fact that the oxides become incandescent when heated.

In the separation of these substances much material has been rendered available for examination of the other associated earths, so that through the development of the industry the by-products have been most valuable in the investigation of the elements of the rare-earth series.

The heats of formation and the heats of decomposition of compounds, the law of mass action, the laws governing liquefaction of gases, &c., all play a part in modern chemistry, and many elements and compounds have been produced, or their method of production improved, owing to the study of these laws.

The use of finely divided metals in chemical reaction has been extended since the researches of Sabatier and Senderens, and various fats and oils are now 'hardened' and rendered useful by hydrogenation in presence of finely divided metallic nickel. Platinum in the form of platinum black is used as a catalyst in numerous industries, for example, the formation of nitric acid from ammonia and air.

The finely divided metals are said to act as catalysts. Other reactions are known where the catalyst need not be a metal; thus ammonia may be synthesized from hydrogen and nitrogen in presence of metallic osmium, but the limited supply of this material and its cost prevent its use on a large scale. Ferric oxide is now used as catalyst, and under certain conditions causes the union of nitrogen and hydrogen to form ammonia.

An interesting process for the preparation of metals depends on the great affinity which aluminium has for oxygen. If aluminium powder be heated with oxide of nickel, the aluminium is transfused into aluminium oxide and metallic nickel is produced, and so much heat is given out during the process that the metal is fused.

Chromium and other refractory metals may be produced in this way. Use has been made of this process, known as the 'Thermit' process, both for the preparation of metals and in welding metals.

INOSITE, or **INOSITOL,** $C_6H_6(OH)_6$, a naturally occurring substance having the same molecular composition as the carbohydrates and often classed with them. It is found in the lungs, kidneys, &c., more abundantly in certain plants, such as unripe French beans, peas, and asparagus.

INOWRAZLAW (ē-nov-rats'láv), or **JUNG-BRESLAU** (Ger. *Hohensalza*), a town of Poland, formerly in the Prussian province of Posen, with beds of rock-salt, saline springs, and various industrial works. Pop. 30,000.

INQUEST, inquiry of any kind. In England in mediæval times inquests were used for a variety of purposes, but to-day the word is confined to inquiries held by a coroner. These usually concern persons who die suddenly, or by violence, in fact, every one for whom a doctor will not give a certificate stating the cause of death. The coroner also holds inquests on treasure trove. At one time a coroner had always to sit with a jury, but since 1927 he need only summon a jury if he thinks that the death was due to violence, such as murder or manslaughter, or to a street accident. *See* CORONER.

INQUISITION, in the Roman Catholic Church, a court or tribunal established for the examination and punishment of heretics. The institution was founded in the twelfth century by Father Dominic, who was charged by Pope Innocent III with orders to incite Catholic princes and people to extirpate heretics. Pope Gregory IX in 1233 completed the design of his predecessors, and the Inquisition was successively introduced into several parts of Italy, and, with certain limitations, into some provinces of France. It never managed to establish itself in England at all.

The tribunals of faith were admitted into Spain in the middle of the thirteenth century; but a firm opposition was made to them, particularly in Castile and Leon, and the bishops there maintained their exclusive jurisdiction in spiritual matters. A change, however, afterwards took place; and while in other countries of Europe the Inquisition could never obtain a firm footing—in some falling entirely into disuse, as in France—in Spain it became firmly established towards the end of the fifteenth century, under Ferdinand and Isabella, who used it as a weapon to break the strength of

the nobles, and to render the royal authority absolute.

In 1477, when several turbulent nobles had been reduced in the southern part of Spain, Queen Isabella went with the Cardinal Pedro Gonzalez de Mendoza to Seville, where this prelate, as Archbishop of Seville, made the first attempt to introduce the Inquisition, especially with regard to citizens of Jewish origin. After this the design was disclosed of extending it over the whole country.

In the Assembly of the States held at Toledo, 1480, the erection of the new tribunal was urged by the cardinal, and after some opposition established under the name of the General or Supreme Inquisition. The new

Various styles of San-Benito

court was opened in Seville in 1481. Torquemada, prior of the Dominican convent at Segovia, and father-confessor to the Cardinal Mendoza, had already been appointed by Ferdinand and Isabella the first Grand Inquisitor in 1478.

The Dominican monastery at Seville soon became insufficient to contain the numerous prisoners, and more than 2,000 persons are said to have been burned alive in the first year or two. The Pope, however, opposed the establishment of the Spanish Inquisition as the conversion of an ecclesiastical into a secular tribunal, and repeatedly summoned the Inquisitor-General to Rome. Torquemada, instead of obeying, sent a friend to defend his cause, and in 1483 Sixtus IV was obliged to yield and acknowledge Torquemada as Inquisitor-General of Castile and Leon, and a later Bull subjected Aragon, Valencia, and Sicily to the Inquisitor-General of Castile.

The introduction of the new tribunal was attended with risings and opposition in many places, as at Saragossa, but the people were obliged to yield in the contest. The tribunal was wholly dependent on the Spanish sovereigns, and became a powerful instrument for establishing the arbitrary power of the king on the ruins of the national freedom; for putting down the clergy, who had previously acknowledged only the jurisdiction of the Roman see; and for oppressing the nobles, and taking away the privileges of the estates. The property of those who were condemned fell to the king; and, although it had been granted to the Inquisition, it was still at his disposal. Ferdinand and Isabella, indeed, devoted a part of this property to founding convents and hospitals; but the Church, notwithstanding, lost many possessions by means of the Inquisition.

It is computed that there were in Spain above 20,000 officers of the Inquisition, called *familiars*, who served as spies and informers. These posts were sought even by persons of rank, on account of the great privileges connected with them.

The supreme tribunal, under the Inquisitor-General, sat at Madrid. He was assisted by a council of six or seven, and there were various officials belonging to the court, the one specially appointed to carry on prosecutions being called the fiscal.

As soon as an accuser appeared, and the fiscal had called upon the court to exercise their authority, an order was issued to seize the accused. If he did not appear at the third summons, he was excommunicated. From the moment that the prisoner was in the power of the court he was cut off from the world. The advocate who was appointed to defend him could not speak to him except in the presence of the inquisitors.

The accused was not confronted with the accuser nor the witnesses before the court, neither were they made known to him; and he was often subjected to the torture to extort a confession, or to explain circumstances which had not been fully explained by the witnesses. Imprisonment, often for life, scourging, and the loss of property were the punishments to which the penitent was subjected.

Wearing the *san-benito*, or vest of penitence—a sort of coarse yellow tunic, with a cross on the breast and back, and painted over with devils—

was a common method of punishment, the penitent having to wear it for a fixed period. When sentence of death was pronounced against the accused, the *auto da fé*, or ceremony of burning the heretic in public, was ordered. This usually took place on Sunday, between Trinity Sunday and Advent. As 'the Church never pollutes herself with blood,' a servant of the Inquisition, at the close of the procession and ecclesiastical ceremonial preceding the execution of the sentence, gave each of those who had been sentenced a blow with the hand, to signify that the Inquisition had no longer any power over them, and that the victims were abandoned (*relaxados*) to the secular arm.

A civil officer, 'who was affectionately charged to treat them kindly and mercifully,' now received the condemned, bound them with chains, and led them to the place of execution. They were then asked in what faith they would die. Those who answered the Catholic were first strangled; the rest were burned alive. Even in more modern times the original organization of the Inquisition was but little changed, but the *auto da fé* was seldom witnessed during the eighteenth century.

The powers of the Inquisition afterwards became more limited, however, by various restrictions, and at last, under Joseph Bonaparte, it was abolished altogether in 1808. It was re-established in 1814 by Ferdinand VII, but on the adoption of the constitution of the Cortes in 1820 it was again abolished. It was, however, partially restored in 1825, and finally abolished only in 1834. According to the estimate of its historian, Llorente, the number of victims of the Spanish Inquisition from 1481 to 1808 amounted to 341,021. Of these nearly 32,000 were burned.

The Inquisition, abolished for Italy by Napoleon in 1808, restored in Rome by Pius VII in 1814, existed, nominally at least, as one of the 'congregations' until 1870. The censorship of the press was under it.—BIBLIOGRAPHY: J. A. Llorente, *History of the Inquisition in Spain*; L. Pastor, *History of the Popes*; H. C. Lea, *History of the Inquisition of the Middle Ages* (3 vols.); *History of the Inquisition in Spain*; S. Reinach, *Cultes, Mythes et Religions*.

INSANITY is due to the disordered functions of the mind. Contrary to the dogma of psychological medicine that is the fashion at the present time, such disorders are not in every case, or in the majority of cases, the result of any physical changes in the brain, but are psychical in origin. By this is meant that some worry or anxiety or some disturbing personal experience of one kind or another has so influenced the feelings and behaviour of an individual that he reacts in an unusual manner to emotional problems which every human being has to solve.

The exciting cause of the disturbance and the emotional storm that results from it may be thwarted ambition, business worries, family anxieties, the disaccord between individual sexual desires and social convention, or any of the thousand and one conflicts that develop between the instinctive impulses and the complex conditions and the innumerable restraints of modern civilized life.

It is only within recent years that certain physicians have come to realize that in the majority of cases of mental alienation the explanation is to be sought not in the physical damage to the brain nor in the less tangible effects of heredity so much as in the individual experiences of each patient. At the same time, and as an integral part of the scheme of interpretation, psychologists have begun to pay attention to the vast importance of the instinctive and emotional aspects of mental life, both under normal and abnormal conditions, and to realize how profoundly the thoughts and actions of every individual are affected by unconscious effects of experience and of instinctive impulses.

There are many kinds of mental disorder which are directly due to physical damage to the brain. Anything that destroys certain parts of the cerebral cortex, whether mechanical injury, the growth of a tumour, the prolonged action of a poison, or the effects of certain organisms, such as that of syphilis, may affect the intelligence and produce different phases of insanity, culminating in that complete loss of control which is called *dementia*.

Of such forms of mental alienation due to a physical cause perhaps the most important is *general paralysis of the insane*. This progressive form of mental degeneration, which leads sooner or later to complete dementia, is due to the action of the spirochæte of syphilis, and as a rule does not reveal itself until many years after the primary stage of the venereal disease to which the diseased condition is due. In the earlier stages of general paralysis the patient often is subject to grandiose delusions and the reckless spending of money on useless objects.

Another common cause of insanity is the habitual ingestion of poisons, such as alcohol and various drugs that may affect the structure of the cerebral cortex. But it must not be forgotten that the resort to alcohol, opium, hashish, cocaine, &c., is often prompted by the desire to get some re-

lief, however temporary, from worry and anxiety, which in the end may be the real exciting cause of an insanity that may be wrongly attributed to the drugs and the physical changes in the brain following their use.

Severe epilepsy may in course of time be followed by degenerative changes in the brain and a progressive impairment of intelligence, passing into dementia or conditions of paralysis. But it must be remembered that in the majority of cases of epilepsy no physical affection of the brain can be detected; in fact the view is now emerging that many, if not all, cases of true epilepsy are functional disorders due to some emotional disturbance in early childhood.

In old age the cerebral cortex is liable to a wasting that may manifest itself in senile dementia. Only a relatively small proportion of mentally-deranged patients (perhaps about 6 per cent) suffer from the so-called maniac-depressive form of insanity which the general public are apt to associate with the idea of lunacy. Mania and melancholia are not diseases, but merely symptoms or different phases in the manifestations of certain mental disorders.

Melancholia is a condition of abnormal sadness which may be present without any defect of memory or even of intelligence. Mania is an abnormally excited state with great restlessness. In these affections no recognizable changes in the brain can be detected, but they are often associated with some emotional cause such as thwarted ambition.

According to Jung nearly half of the asylum patients "suffer from the real and common mental disease called *dementia præcox*. The name is a very unhappy one, for the dementia is not always precocious, nor in all cases is there dementia. Unfortunately the disease is too often incurable; even in the best cases, in those that recover, where the outside public would not observe any abnormality, there is always really present some defect in the emotional life. The picture presented by the disease is extraordinarily diverse; generally there is some disorder of feeling, frequently delusions and hallucinations."

Within recent years far too much significance has been attached to the influence of heredity as a cause of mental alienation. Too little attention has been given to the part played by social worries and anxieties and the general domestic upheaval in a home where an insane parent is living. The children in such an environment will be subjected to a variety of emotional disturbances and social shocks, and to all the conditions that are apt to excite mental conflict. In such circumstances one can explain the genesis of many cases of mental disorder without resorting to the factor of heredity.

The new outlook on the problems of mental disorder which the fuller understanding of its psychical origin has afforded is a much more hopeful prospect than the old attitude of despair, which in practice meant leaving the patient until his ailment became fully developed, and in many cases beyond hope of cure, and then incarcerating him or her in an asylum.

If the nature of the most common forms of mental disorder is recognized at an early stage, its true cause determined, and appropriate treatment given by a wise and understanding physician, there is now a reasonable hope of curing the trouble. The old attitude of persuading people with real anxieties and mental conflicts to 'forget their worries' is the root of the failure in the past. The only satisfactory method of dealing with such troubles is for the patient to unburden them to a wise and sympathetic adviser, and by discussion to look at his difficulties calmly and rationally, stripped of all the emotional colouring that makes such conflicts so destructive to his peace of mind, i.e. his mental health. As Siegfried Sassoon has expressed it with all the true poet's insight and power of emphasizing essentials:

> And it's been proved that soldiers don't go mad
> Unless they lose control of ugly thoughts
> That drive them out to jabber among the trees.

—BIBLIOGRAPHY: F. Peterson, *Mental Diseases*; Maudsley, *The Pathology of Mind*; Sir J. B. Tuke, *Dictionary of Psychological Medicine*; B. Hart, *Psychology of Insanity*; B. Hollander, *First Signs of Insanity*; W. H. Stoddart, *Mind and its Disorders*.

INSCRIPTIONS. *See* CUNEIFORM WRITING; HIEROGLYPHICS.

INSECTIV'ORA, an order of mammals living to a great extent on insects. They are plantigrade, and have a well-developed clavicle, a discoidal placenta, incisor teeth larger than the canine, and molar teeth set with sharp conical cusps. They are usually of small size, and many of them live underground, hibernating for some months. They are found throughout the world with the exception of Australia and South America. The chief insectivorous families are the Talpidæ or moles, the Soricidæ or shrew-mice, and the Erinaceidæ or hedgehogs.

INSECTIVOROUS PLANTS. *See* CARNIVOROUS PLANTS.

INSOM'NIA, or SLEEPLESSNESS, varies from absolute wakefulness to a dull stupor or fitful slumber disturbed by unpleasant dreams. The most common cause is anxiety and worry; in-

somnia from this cause may often be remedied by frankly discussing the causes of the worry with some wise counsellor, and by learning to take a rational view of the matter, getting rid of the anxiety. Other causes are bad ventilation and indigestion.

Brisk evening exercise in the open air, cold baths, or mustard foot-baths are recommended, and drugs have sometimes to be resorted to in continued insomnia, but the use of opium and chloral hydrate is to be discouraged, the safest drug being bromide of potassium. Insomnia as the result of indigestion, constipation, &c., is to be treated by the removal of the cause. *See* SLEEP.

INSPIRATION, from Latin *inspirare*, to breathe into, as opposed to expiration is the act of drawing in the breath through the lungs.

INSPIRA'TION, in theology, is the infusion of ideas into the human mind by the Holy Spirit. By the *inspiration of the Scriptures* is meant the influence of the Holy Spirit exercised on the understandings, imaginations, memories, and other mental faculties of the writers, by means of which they were qualified for communicating to the world divine revelation, or the knowledge of the will of God.

Theological writers have enumerated several kinds or degrees of inspiration, which are founded upon the supposition that God gave to the authors of the Bible that measure and degree of assistance which was just suited to the nature of the subjects which they committed to writing, and did not supersede the use of their natural powers and faculties, and of their acquired knowledge, where these were sufficient. Thus distinctions have been drawn between inspiration of direction, inspiration of superintendency, inspiration of elevation, and inspiration of suggestion.

All orthodox theologians agree in ascribing divine assistance to the scriptural writers, but differ widely as to the degree, extent, and mode of inspiration. The advocates of *plenary* inspiration assert that every verse of the Bible, every word of it, every syllable, every letter is the direct utterance of the Most High. In opposition to this theory some writers confine inspiration to all that is directly religious in the Bible, to all that is matter of direct revelation, leaving out of the question all that can be known by ordinary intellectual application.

Other authorities attribute inspiration only to the spirit, ideas, or doctrines of the Scriptures, exempting the strict form or letter. Some go yet further, and include in the fallible sections the mode of argument and expository details. Opponents of the idea of inspiration and revelation maintain that real divine revelation lies in human progress. They base their theory upon the facts of evolution as seen in history, and compare the causes operating in religion to the causes which are responsible for civilization in general. The Bible, therefore, is only a human book, but the greatest of all human books.—BIBLIOGRAPHY: J. Orr. *Revelation and Inspiration*; W. Sanday, *Inspiration*; R. F. Horton; *Inspiration and the Bible*; G. L. Raymond, *Psychology of Inspiration*.

INSTERBURG, a town of Prussia, province of East Prussia, 16 miles west of Gumbinnen, at the confluence of the Angerap and Inster, which here form the Pregel. It has iron-foundries, distilling, brewing, manufactures of linen, leather, and earthenware. The town was occupied by the Russians during the European War (Aug. 1914). Pop. 39,311.

INSTINCT, the power by which, independently of all instruction or experience, and without deliberation, animals are directed to do spontaneously whatever is necessary for the preservation of the individual, or the continuation of the kind.

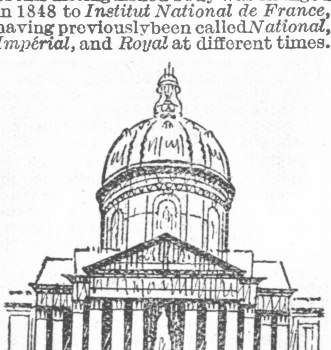
Three main theories have been held with regard to instinctive actions: (1) That these various impulses and faculties were bestowed by nature upon each species. (2) That instinct is the accumulated results of individual experience, fixed by repetition, and transmitted as an inheritance to succeeding races. In this view instinct is intelligent in its origin, an organized experience, a 'lapsed intelligence.' (3) That the greater number of complex instincts arise through the natural selection of variations of simpler instinctive actions—variations arising from unknown causes. The last theory is that of Darwin. *See* NATURAL SELECTION; PSYCHOLOGY.

INSTITUTE OF FRANCE, the principal philosophical and literary society of France, organized after the first storm of the French Revolution in 1795 to replace the Académie Française, the Académie des Sciences, and the Académie des Belles-Lettres et Inscriptions, its object being the advancement of the arts and sciences.

The Institute now embraces five distinct divisions or *académies*, each having a separate field of knowledge or thought. (1) The *Académie Française*, originally established early in the seventeenth century. Its department is the French language and literature, and its membership is limited to 40. (2) The *Académie des Inscriptions et Belles-Lettres*; ordinary members,

40. (3) The *Académie des Sciences*; ordinary members, 65. (4) The *Académie des Beaux-Arts*; ordinary members, 40. (5) The *Académie des Sciences Morales et Politiques*; ordinary members, 40. Each academy has an independent organization and a free disposition of the funds committed to it. Members are elected for life by ballot, and have an annual allowance of 1,500 francs. To each academy, except the Académie Française, are attached some honorary members.

Admission into the Académie Française is a great object of ambition with most French literary men. The name of this distinguished body was changed in 1848 to *Institut National de France*, having previously been called *National*, *Impérial*, and *Royal* at different times.



Institut de France

The Institute of France receives an annual grant from the Government, and has also received, as a donation from the Duc d'Aumale, the domain of Chantilly. It distributes annually in literary and scientific prizes about 680,000 francs. Among these prizes the Prix Osiris, 100,000 francs, is the most noteworthy.

INSTITUT FRANÇAIS, a French educational institution in London, founded in 1910 under the name of Université des Lettres Françaises. It organizes French lectures and classes, and generally fosters an understanding between Great Britain and France.

INSULATING MATERIALS are used in the construction of electric plant, apparatus, and machinery. A good insulating material must have high dielectric strength (measured in kilovolts per centimetre) and high electrical resistance (measured in megohms, each of which is one million ohms). For most purposes it must be tough, flexible, and non-hygroscopic, and must be able to withstand continuously a fairly high temperature.

The material is generally used in sheets or tapes, and its dielectric strength is found by placing a known thickness (usually 0·01 inch) between two flat circular electrodes, and increasing the pressure between them until the material breaks down electrically (i.e. is unable to withstand electrical pressure). This 'break-down voltage' is divided by the thickness of the layer and the kilo-volt per centimetre (or per inch) deduced. The dielectric strength can be raised a great deal by prolonged baking, but this process often injures the material, and it is therefore not wise to use higher dielectric strengths than are really necessary. The materials in general use are as follows:

Dry Air. This is a good insulator, but its field of application is limited.

Paper. This material is used in high-pressure electric cables. A tough paper is wound on to the copper conductor by a winding-machine. The coil of cable is then baked in a vacuum oven to expel all moisture, and, when sufficiently baked, impregnating material is run into the oven from the bottom until it covers the coil. Atmospheric pressure is then slowly restored, and the impregnating material is pushed home into the paper.

The impregnating material is usually a paraffin or bitumen base, dissolved in a thin oil. The exact composition is a piece of the manufacturer's stock-in-trade. Various varieties of paper are used in the insulation of machinery, and these go under their trade names, such as fuller board, leatheroid, &c.

Cloth. Cloth which has been suitably treated is sold under various names. 'Empire cloth,' for instance, is a cambric cloth which has been treated with linseed oil.

Micanite. This material is a very good slot and commutator insulation. It is made of thin flakes of mica, which are stuck together with a flexible varnish. It is also made in tubes, which can be sawn and worked very much like wood. It can be readily moulded to suit various slot shapes. Micarta is a variety of this material.

Glass. Glass, varnished with shellac, is used in certain kinds of electrical apparatus.

Porcelain. Porcelain insulators are used for insulating the wires from the poles in telegraph and overhead power lines.

Dielectric Strengths. Average figures are: air, 80; paper, 250; cloth, 750; micanite, 800; glass, 300; porcelain, 300. The figures are in kilovolts (maxi-

mum) per inch.—BIBLIOGRAPHY: F. W. Peck, *Dielectric Phenomena*; A. Gray, *Electrical Machine Design*.

INSULATOR. A body which offers very great resistance to the flow of electricity through it or over its surface. There is no perfect insulator of electricity, just as there is no perfect conductor. An electric charge may be retained on a body by suspending the body by a silk thread, or by supporting it on a stem made of ebonite, glass, porcelain, or sulphur.

In telegraphic systems, the overhead wires are insulated by being attached to masses of glazed porcelain. Certain oils have good insulating properties. One of the best insulators is dry air.

INSULIN, a product of unknown nature derived from the sweet-bread or pancreas of animals, and found of great value in diabetes (q.v.). It was discovered in 1922 by Dr. F. G. Banting of Toronto. The symptoms of diabetes disappear when insulin is taken, and the patient becomes quite well, but he must continue with the remedy or the symptoms return.

Insulin is valueless when taken by the mouth—it must be injected. Large doses are dangerous, although their effects can generally be neutralized by glucose or barley sugar. Insulin has revolutionized the treatment of diabetes, but it should never be used except under strict medical control.

INSURANCE as a business comprehends most varied contracts by which, in general principle, one party agrees, for a consideration, to pay to another party a sum of money, or make good the loss, upon the occurrence of a stipulated contingency classified under the headings 'fire,' 'life,' 'marine,' 'accident,' and 'general.' Indemnification is the common basis of contract. It is practised by mutual or proprietary companies which are associated or non-associated (i.e. acting either upon conventional or independent experience) and by Government in many forms. The large joint-stock companies, owing to their underwriting all classes of insurances, are known as the 'composite' offices. Without the protection of insurance, great undertakings would not be attempted, nor could they be carried on. Banking must have that collateral security whether it be in connection with buildings or goods upon which loans are granted. The thrifty must have provision for their small savings against the contingencies of sickness, accident, and death.

History. Insurance in one form or another existed in the remote ages, and was effected by voluntary or compulsory contribution. The oldest form of insurance as practised at present is *marine insurance*. The commerce that grew up between Italian and other ports of the Mediterranean was so important that provisions of the character must have been in vogue. Marine laws observed in the Levant became known as the Rhodian Laws, which would indicate the periods (900 and 700 B.C.) of Rhodian prosperity. There is, however, no evidence that marine insurance existed commercially before A.D. 1000. It is recorded by Villani—the Florentine historian (who died in 1348 at an advanced age)—that when the Jews were expelled from France in 1182 by Philip Augustus, they adopted a system of insurance of their property.

At the close of the twelfth or beginning of the thirteenth century it was practised by Lombard merchants, and it was not until the early part of the sixteenth century that they (the Lombards) brought the system from Italy to London, although in 1601 the Government of Elizabeth (43 *Eliz.*, cap. xii) declared that marine insurance had existed from time immemorial and described it as a means "whereby it cometh to pass that upon the loss or perishing of any ship there followeth not the undoing of any man, but the loss lighteth rather easily upon many than heavy upon few, and rather upon them that adventure not than upon those who do adventure, whereby all merchants especially those of the younger sort, are allured to venture more willingly and more freely."

In 1688, at a coffee-house kept by Edward Lloyd in Tower Street, London, the institution known as 'Lloyds' was originated. Four years afterwards it was moved to Lombard Street, and again in 1774 the business was removed to the Royal Exchange, where it is still conducted, although the building has been twice burned down. A good number of insurance companies also carry on business in the same building. The coffee-house was a meeting-place for merchants and seamen, and in those far-off days the policies were there arranged and subscribed by regular attenders.

Edward Lloyd died in 1712, but his name survived and was associated with a monopoly in marine insurance until 1720, when insurance companies were first established by royal favour to issue marine policies. In 1871 Lloyds became an incorporated body for the purpose of conducting marine insurance business, and it was not until the year 1908 that a majority of its members brought about a change with a view to maintaining and enhancing its credit without interfering with the individual liberty of members who now subscribe to all forms of insurance contracts, each upon his own behalf.

Lloyds Register of Shipping, founded in 1760 and reconstituted in 1834, is a separate body, and issues an underwriter's hand-book and classification of seagoing vessels from which the familiar phrase of "A1 at Lloyds" is extracted.

To the Great Fire of London in 1666 is attributed the development and rapid progress of systematized insurance against perils of all kinds. Modern *fire insurance* is thus recognized as essentially British. It had its genesis and early practice in London, and seems to have followed in the track of British shipping throughout the world.

Some Historic Fires. The following are the most notable: London, 1666, £10,000,000; Chicago, 1871, £33,000,000; Boston, U.S.A., 1872, £14,000,000; Baltimore, 1904, £10,000,000; and San Francisco, 1906, £50,000,000. The last mentioned cost the British companies no less than £30,000,000. This calamity, which ranks as the worst ever experienced, had its origin in an earthquake. The area of the fire was 7 sq. miles, and the total loss of life was about 1,000.

The seventeenth-century fire insurance offices deemed it necessary that no building should be considered insured by them until the 'mark' of the insuring office had been actually affixed thereon. This was apparently to prevent fraud by reason of a person obtaining a policy indirectly after the fire had happened. These 'trade marks' were designed in lead or copper plates or shields about twelve inches in diameter, and some may yet be seen attached to old buildings, for the practice was continued past the middle of last century

As the insurance companies increased in numbers, so did their private fire and salvage corps multiply, until in 1808 55 engines were kept in London alone. It is recorded that it was no uncommon incident that a brigade on arrival would withdraw immediately upon noticing the 'fire mark' of another office, leaving the extinguishment to the brigade belonging to the insuring office. In 1825 a number of these companies consolidated their fire brigades, and in 1833 all were united, but not until 1866 were they turned over to the city, and in accordance with the Metropolitan Fire Brigade Act, 1865, the companies contribute towards the expense of maintaining the fire brigade on the basis of the amount insured.

Tabulated returns for 1921 show that the gross sums insured against fire during the previous year in respect of property in the administrative County of London amounted to £1,582,537,305. In 1869 a tax payable by the insured, based on the amount covered by his policy, was abolished being looked upon as a tax upon prudence.

The oldest existing insurance office in the world was founded in 1710, and it was the first to transact the insurance of personal property—previously only buildings were covered—and it was found necessary to provide a body of men to remove insured goods from burning buildings, and to protect them later from thieves and pilferers. It may be assumed that that office was the originator of the modern salvage corps, now established by the fire offices in London, Liverpool, and Glasgow.

In the early days of insurance of all kinds it was found necessary for offices or underwriters to meet occasionally for consultation, for protective measures, mutual advantage, and benefit, and in 1791 the first combination of London fire offices was established. In 1858 the association known as the Fire Offices Committee was instituted, with control of its branch establishments through the kingdom, for rating or salvage operations, superseding the old 'Scotch Fire Offices' of Edinburgh established in 1829.

The most common terms used in the practice of insurance are as follows: *insurance* and *assurance* are used synonymously, but in life offices the word 'assurance' is most consistently used. The *insurer* or *underwriter* is the party to the contract who undertakes to insure or assure. The insured or assured is the party to whom the insurance is granted. The *rate* is the charge per cent or per mille on the amount insured. The *premium* is the amount of consideration given by the insured to the insurer.

The *risk* or *peril* refers to (1) the liability undertaken by the insurer, (2) the subject insured, or (3) the liability of the insured. The *policy* is the document containing the definition of the contract or the instrument of agreement. The *cover note* is the acknowledgment of temporary protection pending decision on the *proposal*, which is the overture. The cover note is also termed *interim protection note* and *deposit receipt*.

The term 'underwriter' was at one time confined to marine insurance, and referred to the individual who subscribed his name to the 'underwriting' sheet or policy for a fractional part of the entire sum to be covered, but it is now applied generally.

Average. Any reference to insurance would be incomplete without some even brief description of 'average,' for the governing principle in carrying on the business in all its ramifications is the application of the

law of average. In fire insurance, however, we have the phrase 'subject to average' very often as a condition of the policy. In this case, to obtain full recovery of any partial loss, the total amount of insurance must represent the total value of the property, and if through failure or otherwise any underwriter or co-insurer becomes a defaulter, then the insured is deemed to be so much under-insured, and must bear a proportion of the loss accordingly.

The clause has its variations, but all bear upon the fact that the insured is free to carry as much or as little insurance as he deems needful, but fixes the proportion of the loss payable to such as the insured has chosen to pay for. If he insures for only one-half, then he can only recover one-half of the loss. If he insure the whole of the value, the whole of the loss is recoverable. Some of the forms of average only operate, however, after a certain percentage in favour of the insured has been allowed, and instead of being required to cover to the full value of the property to obtain indemnity for any loss he may sustain, he may safely insure for 50, 75, or 90 per cent, as the case may be, of the total value at risk, and recover full partial loss.

With regard to marine insurance the term 'average' has a different purpose, and the origin of its present-day meaning is not traceable. Here are some of its forms: *particular average* is the damage to, or partial loss of, particular goods insured, for which a contribution may be due from the underwriter. E.g. 'A' insured ten cases of grocery goods. On arrival at destination one or all were found to be damaged by perils of the sea; that would be 'particular average.'

General average is a contribution due from all interests, and, if insured, recoverable from the insurer. It occurs if during the voyage sacrifices be made of any part of the ship or cargo, or any extraordinary expense incurred to prevent loss of the whole or to rescue the whole from unusual peril; or if the ship be on fire, the cargo damaged by the water would be 'general average,' but the cargo damaged by fire only would be 'particular average,' because the damage from that cause would be accidental. 'General average' is a part of maritime law, and its underlying principle in practice is equity.

Two principles governing all contracts of insurance are those of 'uberrimæ fidei' and 'insurable interest.'

All contracts of assurance require the highest good faith on the part of the proposer. Failure to disclose any material fact, which would influence the mind of the assurer, giving him the right to repudiate liability. If the proposal form provides that the statements in it shall be the basis of the contract then, if the information given turns out to be incorrect, though made innocently by the proposer, the policy is void.

Again, every person entering into a contract of life, fire or marine insurance must have an insurable interest, i.e. must stand to benefit by the continued existence of the life or thing insured. In life assurance this pecuniary interest must be present at the date of the assurance; in fire insurance at the date of the assurance and at the date of the loss, while in marine insurance it need only be present at the time of the loss. It is a criminal offence to insure a ship in which one has no insurable interest.

A summary of insurances that may be effected under the various headings follows:

Life Assurance insures against an event the occurrence of which is inevitable, and is effected with or without 'profits,' i.e. participation or non-participation in the profits earned, for which purposes a valuation is made quinquennially, as required by the Assurance Companies Act, 1909, and a reversionary bonus declared according to the ascertained result. The most popular systems of life assurance are: whole life assurance; endowment assurance, by which the sum assured is payable at death or maturity of the policy at a certain age; joint lives or partnership assurances, payable at first death.

The Industrial Assurance Act, 1923, authorizes the issue of policies on the life of a parent, child, grandparent, grandchild, brother or sister, for the provision of funeral expenses. The word child includes an adopted child, but parent does not include step-parent; further, a mother may under the Act, assure her illegitimate child. In all these cases the Act dispenses with proof of insurable interest—or deems it to exist.

The Act of 1923 applies to life assurances for small amounts where the premiums are collected at shorter intervals than two months. It places restrictions on infantile policies. The limits are £6 for a child under 3 years; £10 for a child up to 6 years, and £15 for a child up to 10 years. If these amounts are exceeded the policy is illegal and if the policy was issued since Jan., 1924, the premiums can be reclaimed; otherwise the cash surrender value can be claimed. Where a proposal form is filled wholly or partially by an agent of the society or company the policy cannot be repudiated on the ground of misstatement, unless made fraudulently, i.e.

knowing it to be false. Misstatements as to (*a*) age may be rectified by adjusting the policy; (*b*) as to state of health, can be raised within 2 years.

Policy-holders are given certain rights over and above the contract in the policy.

No forfeiture can be incurred until default has been made in paying arrears, after 28 days' notice. Then within one year from service of the notice, if 5 years' premiums have been paid (3 years in an endowment policy of less than 25 years), the policy-holder can claim a paid-up policy. Certain restrictions are placed on the transfer of a policy from one society to another.

The Act of 1929 validates endowment policies on the lives of the persons mentioned in the Act of 1923. Subject to the limitation that the amounts must not exceed a reasonable amount for funeral expenses. This Act gives a right to a paid-up policy where at least one year's premium has been paid; or to a cash surrender of 90 per cent of this paid-up policy. The Act gives no right to a cash surrender on one's own, or his wife's life.

Generally, cash surrenders can be claimed:

(*a*) Where a policy is illegal.
(*b*) Where a policy-holder has gone to reside permanently abroad.
(*c*) Where the assured has disappeared and his existence is in doubt.
(*d*) In endowment policies within the Act of 1929.
(*e*) In all other cases where the policy so provides.

Fire Insurance indemnifies against loss occasioned by a single occurrence. Rates vary according to the hazard of risk and are fixed on a minimum basis, generally the result of wide and mature experience of the combined action of the offices. Lightning losses are paid for whether fire ensues or not. Losses by explosion of domestic boilers or of illuminating gas (except on premises where gas is manufactured) are covered as fire damage. Damage caused by water in extinguishing a fire is regarded as fire damage.

Householders 'comprehensive' policies are now issued by which buildings are covered against fire, explosion, lightning, thunderbolt, and damage by burglars, and household effects are covered against loss or damage by fire, explosion, storm, tempest, flood, bursting of water-pipes, earthquake, lightning, thunderbolt, burglary, house-breaking, larceny, theft, aircraft, also loss of rent, breakage of mirrors, damage to servants' goods, compensation for death by fire or burglary, riot and civil commotion, strike and labour disturbances in Great Britain, accidents to servants, and public liability.

Loss of Profits through Fire. The interruption in trading may be separately insured against, covering the reduction in net profits, standing charges that require to be paid such as interest, on debentures, borrowed capital, salaries, rents, rates, and taxes, and the increased cost of continuing a business in such circumstances.

Marine Insurance undertakes to indemnify a person against the loss of ship, goods, freight, anticipated profits, or any other insurable interest through any of the perils and adventures connected with navigation.

Fire and Marine Insurance are pure contracts of indemnity: only the actual value of the thing lost or damaged can be recovered, and if the owner has insured the same goods or property with several offices he does not profit thereby. He may claim from one or more of the insurers and the offices concerned will adjust the incidence of the loss among themselves. If a house or building is destroyed by fire the insurers may, instead of paying the policy-money, rebuild or reinstate the destroyed premises.

Accident or Casualty Insurance may be said in some measure to owe its origin to the development of railway travelling, for in 1845 the record begins with a list of insurance projects to insure against accidental death and injury, and on 3rd June, 1850, by adoption of a suggestion to insure "compensation for bodily injury occurring to any person or persons from any accidental or violent cause not occasioning death," the Accidental Death Insurance Company instituted the modern system of accident insurance. In the sea laws of Wisby under date 1541, mention is made of the practice of insuring the lives of masters, and many forms of accident insurance were in vogue making provision against personal accidents in ancient times for perils at sea, and in compensation for personal injury in war-time.

In its present-day form it represents one of the most popular adaptations of the principles of insurance to the requirements of everyday life and legal obligations of the public. Workmen's compensation, employers' liability, personal accident and illness, third party or liability to the public for personal injuries and damage to property, driving accidents, property owners' liability, burglary, plate glass, fidelity guarantee (court, Government, and commercial bonds), securities in transit, druggists' liability, life insurances, and forged transfers are all specifically insured in this department.

The following may be included under the term 'General Insurance':

Motor Insurances include claims by the public, loss or damage to the cars, accidents to the insured, medical and surgical expenses, expenses incurred in defence of police court proceedings instituted against the insured owners of motor-cycles, commercial motor vehicles, private motor-cars, and cars of a private type used for business.

Engineering Insurance. Sir William Fairbairn founded at Manchester the first association for the systematic inspection and general supervision of steam-boilers in 1854. Boilers and other steam vessels are insured against damage caused by explosion or collapse, and steam-, gas-, oil-engines and electrical machinery against breakdown. Gas-making plants are insured against all damage by explosion, lifts, hoists, and cranes against breakdown, and liability in respect of personal injury.

Live-stock Insurance. Insurances are effected on horses, bulls, and stock-stock against loss which may be sustained by death from accident or disease.

Claims. When a claim arises it is necessary that brief particulars should be at once intimated, quoting the policy number, and the necessary form will then be sent to be filled up.

A form of insurance is conducted by some of the great national newspapers. By becoming a regular subscriber a person can be insured against accident. The terms are laid down in the newspaper itself. Very large sums are given in case of death in a railway accident, a comparatively rare occurrence, but smaller sums for road accidents. Quite apart from this insurance work are the state schemes for insurance against ill-health and unemployment, which affect some 20,000,000 workers. *See* HEALTH: UNEMPLOYMENT.

INTELLECT (Lat. *intellectus*, understanding, from *intelligere*, to perceive), a philosophical term denoting the capacity of knowing, the thinking part of the mental constitution, or the mental process concerned in the action of cognition. More widely it is applied to the whole rational nature of man. Mind is made up of three elementary constituents—emotion, volition, and intelligence. When we experience pleasure or pain, we are said to feel, a condition which is referred to the emotions; when we strive to obtain the one or escape the other, we exert our will; when we remember, compare, or reason, intelligence is brought into play.

The powers of the intellect have been variously classified. Aristotle distinguished between *intellectus agens* and *intellectus patiens*. The former perished with the body and involved the action of the senses, imagination and memory; the latter, separable from the body and eternal, gives that knowledge form. Reid's classification of the intellect is perception by the senses, memory, conception, abstraction, judgment, reason. To these Stewart added consciousness, attention, imagination, and association of ideas.

Sir William Hamilton adopted the division into six faculties: (1) the presentative faculty, or self-consciousness; (2) the conservative faculty, or memory proper; (3) the reproductive faculty; (4) the representative faculty, or imagination; (5) the elaborative faculty or power of comparison; and (6) the regulative faculty, or the cognition of the instinctive notions of the intellect, as space, time, causation, &c. This classification has remained fundamental in the psychology of common sense. Other classifications of the intellect are memory and reason.

INTENTION. In the interpretation of legal documents the intention of the maker must receive effect. When the language is clear and unambiguous, such intention is to be ascertained only from the document itself. External evidence may sometimes be admitted to explain a latent ambiguity, however, as when it is disputed which of two persons a testator intended to benefit.

INTERCELLULAR SPACES OF PLANTS, the spaces formed by partial separation of the cells as these develop to their adult shape and dimensions. They contain air, and form a continuous system communicating with the outer atmosphere through the stomata and lenticels; their principal function is ventilation of the living tissues, and they also add to the buoyancy of water-plants (in which they are particularly well-developed).

INTERDICT, an ecclesiastical censure in the Roman Catholic Church, the effect of which, taken in its most extended sense, is, that no kind of divine service is celebrated in the place or country under the sentence; the sacraments are not administered, the dead not buried with the rites of the Church. This interdict is called *real* or *local*, whilst the personal interdict regards only one or more persons.

Gregory VII, though not the inventor of this engine of ecclesiastical power, used it oftener and more tyrannically than any of his predecessors. The eleventh century was pre-eminently the century of interdicts, but they gradually lost power; and when Paul V laid Venice under an interdict in 1606, the churches were not

closed nor divine service interrupted, and only a minority of the bishops acknowledged it.

The interdict must be announced, like the excommunication, in writing, with the causes, and is not to be imposed until after three admonitions. The penalty of disobedience to an interdict is excommunication. Writers of the Gallican Church say that the Pope has no right to lay France under an interdict, and the Parliaments refused to register them. Interdicts are not to be confounded with the simple *cessatio a divinis*, or the disuse of religious ceremonies, which takes place when a church has been polluted, for example, by a murder committed in it.

INTERDICT (Lat. *interdicere*, to forbid), in Scots law, an order of the Court of Session, or of a subordinate court, for stopping or prohibiting a person doing an act complained of as unlawful or wrongful. In the Court of Session the interdict is obtained on presenting a note of suspension and interdict to the lord ordinary on the bills; in the subordinate courts by a summary petition to the inferior judge. It corresponds to what is termed in England a writ of injunction (i.e. 'preventive' injuction). *See* INJUNCTION.

INTEREST is the consideration paid to the owner of purchasing power for its temporary use. This consideration must vary with the risk the owner runs of the loss or depreciation of the capital lent, and thus contains an element of insurance. In early times, when loans were sought, not for productive purposes, but from the actual need of help to avoid famine or disaster, the risk run by the lender might be great, and the interest proportionately high in the best of cases. He would also be tempted to exploit the borrower's difficulties to the full. Money-lending thus acquired an evil reputation, which was reflected in current legislation.

Aristotle regarded money as unproductive, and interest, the propagation of money out of money, as contrary to nature. The Christian Fathers adopted his arguments and added others in vehement attacks against the exacting of interest, and in 1311 the Council of Vienna formally forbade it between Christians. It was not until the sixteenth century that the productiveness of loans applied to agriculture, trade, and industry began to be recognized as legitimizing interest.

The attack had always been against interest paid to another person. That the owner of capital who put it into his own industry or agriculture should earn interest on it was taken for granted. It was not until the end of the eighteenth century, with the massing of industrial capital, that the question arose of the justification for interest as an element in the profits of industry. The justification was claimed on various grounds: that a worker furnished with elaborate machinery was made more productive, and that the reward of the increased productivity belonged to the capital which had 'earned' it; that the capital was used and its use must be paid for; that the capital was the product of abstinence, and without a prospective reward the abstinence would not be exercised; that capital was accumulated labour and entitled to its reward; that interest was the reward of the performance of the necessary function of investment.

In the thirty years of peace from 1871 to about 1900 the effective return on Consols sank from 3¼ to 2½ per cent, French *rentes* from 5½ to 3 per cent, Prussian State loans from 5 to 3 per cent, and American State securities from 6 to 2 per cent. The destruction of capital in the Boer War, the Spanish-American, and Sino-Japanese Wars, &c., sent up the rate at the beginning of the present century, but there was no very substantial change until 1914. The calamitous destruction of the European War more than doubled the rate of interest.—BIBLIOGRAPHY: Bentham, *Defence of Usury*. *See also* USURY, MONEYLENDERS ACT.

INTERFERENCE, in physics, the name given to the effect at a point through which two or more trains of waves pass simultaneously. It is an effect to be seen on the surface of liquids over which waves are passing; the effects of interference are heard in sound waves; and many beautiful effects are caused by the interference of light waves.

Striking contrasts are produced when two equal sources send out waves of the same length and amplitude. At points equi-distant from the two sources the waves arrive in the same phase, i.e. their crests, for example, arrive at the same moment, and a wave of double amplitude or height is produced. At other points on each side, the two waves arrive in opposite phase, i.e. the crest of one wave reaches the point at the same instant as the hollow of the other wave, and the resultant effect at the point is zero vibration. The two prongs of a tuning-fork act as generators of sound waves of equal length and amplitude, but of opposite phase, and if a sounding fork is rotated in a vertical position in front of the ear, four positions of the fork may be distinguished for which no sound is heard. The two sets of waves interfere to produce silence.

An analogous effect is produced by waves of light by means of Fresnel's biprism. A narrow slit in front of the biprism is illuminated by monochromatic light, and the prism by refraction produces two trains of waves which cause interference effects on a screen or in an eyepiece, a series of bright and dark bands being seen. The central band is bright, since it is equidistant from the two virtual sources or slits formed by the biprism, and the waves arrive at the central band in the same phase. The bands at either side are dark, being caused by light waves which arrive in opposite phase; the paths by which the light reaches these bands differ in length by half a wave-length. The next outer bands are bright, and the paths to each from the two sources differ by a whole wave-length; and so on. A similar effect is produced when a very weak plano-convex lens is placed on a plane glass surface and illuminated by monochromatic light. The interference of the waves which are reflected to the eye from the two surfaces in contact gives rise to alternate bright and dark concentric rings known as Newton's rings.

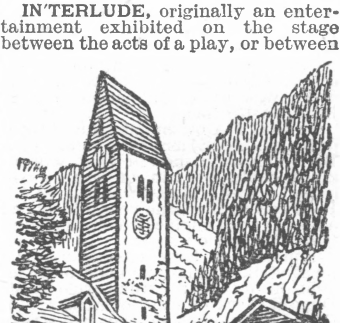
When the wave trains are not of the same wave-length, the effects differ in some respects from those just described. If two tuning-forks, organ-pipes, or piano strings differ slightly in pitch, they will, when sounded together, give rise to a series of beats or accentuated sounds each of which is caused by the simultaneous arrival at the ear of two waves in the same phase. The number of beats heard in one second is equal to the difference between the frequencies of the two sounding bodies. The production of 'beats' with Hertzian waves is employed in the process of heterodyne reception in wireless telegraphy.

When the composite waves of sunlight are in a position to interfere, many beautiful colour effects are produced. The two sets of waves reflected to the eye from the outer and inner surfaces of a soap bubble give rise to the well-known colours of the bubble. The same explanation applies to the colours seen when a thin film of oil spreads over the surface of a sheet of water. A similar effect is observed when an internal rupture occurs in a block of glass or ice. Fresnel's biprism fringes and Newton's rings are applied in the laboratory to measure the wave-length of light. Interference colours may be used to test the planeness of glass surfaces. The bands are also employed in an instrument called an interferometer for measuring lengths in terms of the wave-length of light. Michelson thus found that the standard metre contained 1,533,163·5 wave-lengths of the red light emitted by cadmium. *See* SOUND, SPECTRUM, DIFFRACTION, POLARIZATION OF LIGHT, and ELECTRICITY.

INTERGLACIAL BEDS, geological deposits belonging to some epoch in a glacial period when the climate became ameliorated and the ice-sheets shrank back or almost entirely disappeared. *See* GLACIAL EPOCH.

INTERLA'KEN ('between the lakes'), a village in Switzerland, in the canton and 26 miles S.E. of Berne, beautifully situated near the left bank of the Aar, between the lakes of Thun and Brienz, much resorted to by tourists. Pop. 3,000.

IN'TERLUDE, originally an entertainment exhibited on the stage between the acts of a play, or between



Old Clock Tower, Interlaken

the play and the afterpiece, to amuse the spectators while the actors rested or shifted their dress, or the scenes and decorations were changed. In England dramas known as interludes preceded the rise of the regular drama. (*See* DRAMA.) The name is also given to a brief piece of church music, prepared or extempore, for the organ, and played after each stanza except the last of a metrical psalm or hymn.

INTERMEZZO (in-tĕr-met'so), a short musical piece, generally of a light sparkling character, played between the parts of a more important work, such as an opera, drama, &c. Pieces intended for independent performance are sometimes designated by this name by the French and Italians. A famous intermezzo occurs in Mascagni's *Cavalleria Rusticana,* and another favourite one is to be

found between the second and third acts of Wolf-Ferrari's *Jewels of the Madonna*.

INTERNAL-COMBUSTION ENGINES are prime movers which are driven by the energy obtained from the combustion of mixtures of gas (or vapour) and air. Internal-combustion engines (hereafter referred to as I.C. engines) were invented about 1820 by a clergyman, the Rev. W. Cecil (Camb. Phil. Soc.). He made an engine which worked by the explosions of a mixture of hydrogen and air. W. Barnett in 1838 suggested the compression of the mixture before firing it, to increase its explosive power. Lenoir overcame the most serious of the practical difficulties, and in 1860 produced a commercial engine. In 1866 Otto and Langen introduced a superior type (Inst. Mech. Engineers, 1875). Otto introduced the engine working on the so-called 'Otto' cycle about 1876. This cycle was really the suggestion of Beau de Rochas.

In 1881 J. Dowson introduced 'producer gas' (q.v.) as a fuel, and in 1895 B. H. Thwaite showed that gas-engines could be run on the 'waste gases' from blast-furnaces (q.v.). R. Diesel in the same year introduced a new type of engine, which has found favour as an oil-engine. In the development of large gas-engines, the most striking innovations are the invention of the two-stroke cycle by Sir Dugald Clerk (Society of Arts, 1905); the development of the two-stroke engines, the Koerting (of German origin) and the Oechelhauser (another German engine); and the use by Fullager in recent years of 'oblique connecting-rods' between diagonally-opposite pairs of opposed pistons.

The Oechelhauser engine, manufactured before the European War by the Machinenfabrik Ausberg Nuremberg (M.A.N.) Gesellschaft, is an opposed-piston engine. The 'Still' engine is a recent type which uses steam on one side of the piston and gas on the other. It is now being constructed in single-engine units of 1,200 b.h.p.

As an example of the performance of a medium-power gas-engine installation, figures may be quoted for the installation at the works of the Cargo Fleet Iron Company, Ltd., steel and iron manufacturers, Middlesborough. These figures have been specially contributed by the company. The installation consists of two 600-h.p. gas-engines coupled to generators for generating electric power, and two 1,600-h.p. gas-engines for running blowing-engines. The power-units are tandem-cylinder, double-acting gas-engines driven by blast-furnace gas. They are direct-coupled to D.C. generators of about 350 kilowatts capacity each. Each engine takes about 5,400 gallons of fresh water per hour for cooling purposes, which is returned from a cooling-tower with a 3 per cent loss. The consumption of lubricating oil averages 3½ gallons per day of twenty-four hours for all lubricating purposes, including the oil taken by the cylinders. The ignition is by induction-coil on one engine, and by 'magneto' on the other. Two men are in attendance on the power-units. The units driving the blowing-engines are tandem-cylinder, double-acting engines having back piston-rods, direct-coupled to 92-inch diameter air-blowing cylinders.

The output of each engine is 25,000 c. feet of free air per minute, delivered against a blast-pressure of 10 lb. per square inch. The engines develop 1 i.h.p. hour on 8,400 B.Th.U. The gas, being blast-furnace gas, is of low calorific value—some 100 B.Th.U. per cubic foot. At this figure the gas-consumption of the engines works out at about 84 c. feet of gas per i.h.p. hour. The consumption of lubricating oil is 4 gallons per day of twenty-four hours for each gas-engine and blowing-cylinder. The water-consumption is about 14,400 gallons per hour per engine. In 1917 the blowing-engines ran for 7,932 hours, making the time off duty from various causes 828 hours per annum. This performance occurred after the plant had been running for four years. Two men are in attendance on the blowing-engines. The gas used leaves the blast-furnaces and

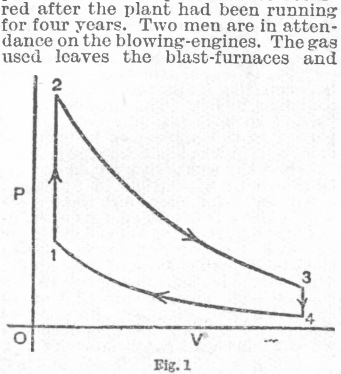


Fig. 1

enters the gas-washers at 300° to 500° F., and contains 2 to 4 grammes of dust per cubic metre. After passing through the gas-washer, the dust content is reduced to 0·006 to 0·008 gramme per cubic metre, and the temperature to 70° F. 80 gallons of sea-water per minute are used in the gas-washers.

A typical analysis of the blast-furnace gas is:

Nitrogen	60·00	per cent.
Carbonic acid	11·00	,,
Carbon monoxide	27·00	,,
Hydrogen	2·00	,,
Calorific value	101	B.Th.U. per c. ft.

The circulating water for cooling the engines enters at about 60° F. and leaves at a temperature between 100° and 120° F. The pistons and piston-rods take some 19 per cent of the total cooling-water used.

The present practice of the National Gas Engine Company is to use tandem cylinders on the Otto cycle in the large-sized engines.

The most important cycles of operation upon which modern I.C. engines work are the Otto, or constant-volume, cycle, and the Diesel, or constant-pressure, cycle.

Otto Cycle. (1) A combustible mixture of gas and air is sucked into a cylinder at approximately atmospheric pressure. (2) It is compressed, approximately adiabatically, to a small volume at a high pressure and a fairly high temperature. (3) It is exploded, and the pressure rises more or less abruptly according to the speed of the explosion. (4) The high-pressure mixture (no longer the same, chemically, as it was in stages 1, 2, and 3) expands approximately adiabatically, doing external work and getting cooler in the process. (5) The burnt mixture at a low pressure and a fairly low temperature is expelled from the cylinder into the atmosphere.

In this cycle we get one explosion per two revolutions of the engine, and the engine is known as a four-stroke engine, i.e. four strokes go to each complete cycle of events. The programme is repeated in the next two revolutions of the engine, and so on

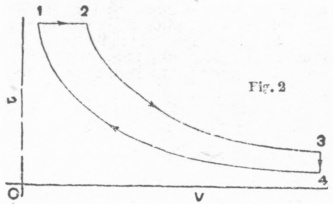


Fig. 2

indefinitely. The nearest ideal cycle to this one is that represented in fig. 1. The theoretical efficiency of this cycle is given by

$$\eta = 1 - \left(\frac{1}{r}\right)^{\gamma-1},$$

where η is the efficiency, r the ratio of expansion, i.e. the ratio of the cylinder volume to the clearance volume, and $\gamma = 1{\cdot}4$.

Diesel Cycle. This cycle differs from the previous one in the much higher pressure that is reached before the fuel is injected, and in the burning of the fuel relatively slowly at constant pressure instead of nearly instantaneously at constant volume. (1) A charge of *air* is sucked into a cylinder at approximately atmospheric pressure and temperature. (2) It is highly compressed, more or less adiabatically, so that its temperature is sufficiently high for oil to burn when squirted into it. (3) By means of a pump, or air at a pressure higher than

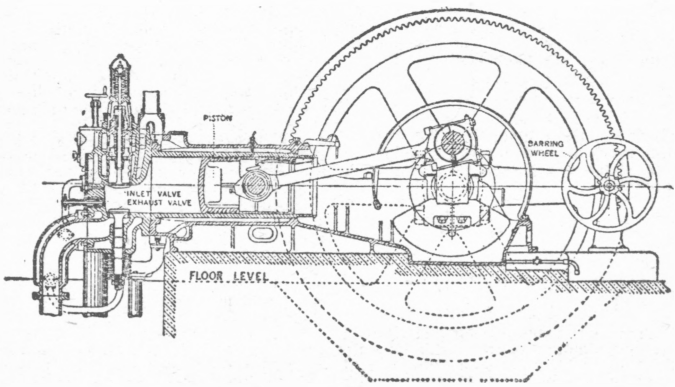


Fig. 3, Crossley Gas-engine

compression, oil is squirted into the cylinder and burns. While burning proceeds, expansion is allowed to take place so that the pressure does not rise i.e. the heat energy of combustion, except such as is used in the expansion referred to, goes into the gas at constant pressure. (4) When combustion is complete, the burnt mixture is allowed to expand more or less adiabatically, thereby doing work and getting cooler. (5) When the piston gets to the end of its stroke, the cylinder is connected to the atmosphere, and the contents of the cylinder, at a fairly low pressure and temperature, are expelled from the cylinder into the atmosphere during the ensuing stroke.

The ideal cycle nearest to this one is shown in fig. 2. The theoretical efficiency of this cycle is given by

$$\eta = 1 - \frac{1}{\gamma}\left\{\frac{\rho^{\gamma}-1}{\rho-1}\right\}\left(\frac{1}{r}\right)^{\gamma-1},$$

where η is the efficiency, ρ the expansion ratio *at constant* pressure, r the total expansion ratio, and $\gamma = 1{\cdot}4$. It can be shown that

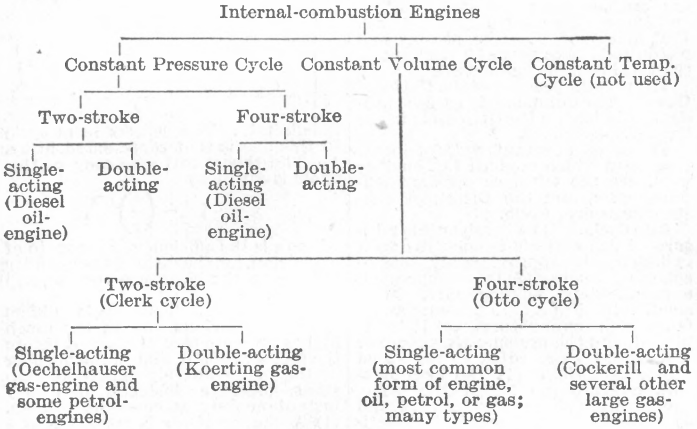
$$\left\{1 - \left(\frac{1}{r}\right)^{\gamma-1}\right\}$$

is greater than

$$\left\{1 - \frac{1}{\gamma}\left\{\frac{\rho^{\gamma}-1}{\rho-1}\right\}\left(\frac{1}{r}\right)^{\gamma-1}\right\}.$$

This result would suggest that a higher efficiency is attainable with an Otto engine than with a Diesel. But in practice a very much greater ratio of compression can be used in the Diesel than in the Otto engine, for the reason that in the Diesel engine a non-explosive substance—pure air—is compressed. In consequence of this the Diesel is more, not less, efficient than the Otto engine, in spite of its mechanical efficiency being somewhat less.

A simple engine, working on either of these cycles, receives energy during one stroke out of four. Such engines are called 'four-stroke' or 'two-cycle' engines.



Modern Engines. Practical engines may be classified in regard to the fuel they use and the speed they run at; thus we get gas-, oil-, or petrol-engines, and high- and low-speed engines. Broadly speaking (there are many exceptions), gas- and oil engines are low-speed engines, and petrol, high-speed ones. The diagram above, taken from Wimperis's *Internal Combustion Engines*, shows very clearly the relationship between the different engines.

(1) *Crossley Gas-engine.*—Fig. 3 is a sectional elevation of a standard Crossley gas-engine working on the Otto cycle. Suppose the engine is at the beginning of the outward (suction) stroke. The exhaust valve is closed, the inlet valve open. A charge of gas and air is thus admitted to the cylinder. The inlet valve now closes (the exhaust continuing closed) and the compression stroke takes place. At the moment of crossing the 'dead-centre,' outwards again, the charge is fired by a carefully-timed electric spark derived from a magneto. Explosion takes place nearly instantaneously and the pressure rises very

quickly. The ensuing outward stroke is the 'expansion' or driving stroke, all the valves being closed. At the end of the expansion stroke the exhaust valve lifts, and the following inward stroke is the scavenging stroke in which the 'dead' products are swept out of the cylinder through the exhaust valve. Fig. 4 shows very clearly the construction of the inlet valves, and how governing is effected on the 'variable-admission' principle.

(2) *Mirrlees-Diesel Engine.* — A typical example of a modern Diesel engine is that illustrated in fig. 5, which shows a sectional end view of the engine. The valves are indicated in fig. 6 by the letters E, A, and F (exhaust, air, fuel).

We shall describe the cycle from the moment when the compression stroke is beginning. Valves E, A, and F are all closed and the piston comes up, compressing the cylinderful of air to a very small volume (about $\frac{1}{13}$ of its original volume). The pressure at the end of compression is about 500 pounds per square inch, and the temperature of the air about 950° F.

The valve F opens after the piston has passed the dead-centre, and oil is sprayed into the cylinder *by compressed air*. Combustion takes place, and the pressure *is maintained* for a little while as the piston moves outwards (*see* fig. 7). The expansion stroke takes place with valves E and A closed. At the end of the expansion stroke the valve E opens, and the charge escapes to atmosphere. The exhaust stroke now takes place with E open and A and F closed. Valve E closes and A opens, and the suction stroke begins and ends with a cylinderful of air, ready for the next cycle.

The compressed air is got from a small air compressor coupled to the main crank shaft. The exhaust and air valves are interchangeable and easily renewable. The fuel valve is simple. The set is shown in fig. 6.

The engine is started by running it on compressed air. A starting lever throws into action the starting valve (fig. 5), and cuts out the fuel valve. The engine is 'barred' round until the starting valve is open, and then it starts on the compressed air and runs as a compressed-air motor on a stored supply of compressed air. When sufficient speed is attained, the starting lever is thrown into the running position, which cuts out the starting valve and leaves it permanently closed, and cuts into action the fuel valve. The engine now picks up speed, running as an oil-engine. Fig. 7 is an actual indicator diagram of this type of engine.

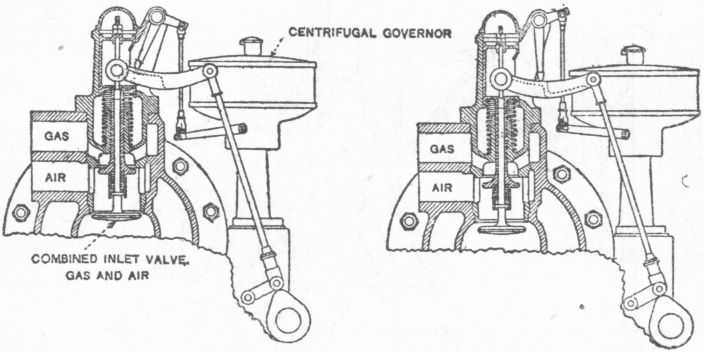


Fig. 4. Crossley Variable-admission governing. F, Movable fulcrum, controlled by centrifugal governor

Many manufacturers construct oil-engines on the Otto cycle. Fig. 8 is made from results of a test by Professor Burstall on a 117-b.h.p Crossley 'cold starting' oil-engine (Oct., 1918). The calorific value of the oil used was 18,500 B.Th.U. per pound. Fig. 9, taken in this test, is a typical indicator diagram for an Otto oil-engine.

The development of the Diesel engine for mercantile marine purposes has been taken up by both British and Italian engineers. The engine they manufacture is a four-stroke single-acting engine. They have standardized a series of cylinders capable of giving 40, 50, 100, and 210 b.h.p. each at a moderate rating of effective pressure and piston speed. The largest standard six-cylinder engine has therefore a continuous rating of 1,250 b.h.p. Each cylinder has a bore of 24 $\frac{7}{8}$ inches, the stroke being 38 inches. The piston speed at 125 r.p.m.

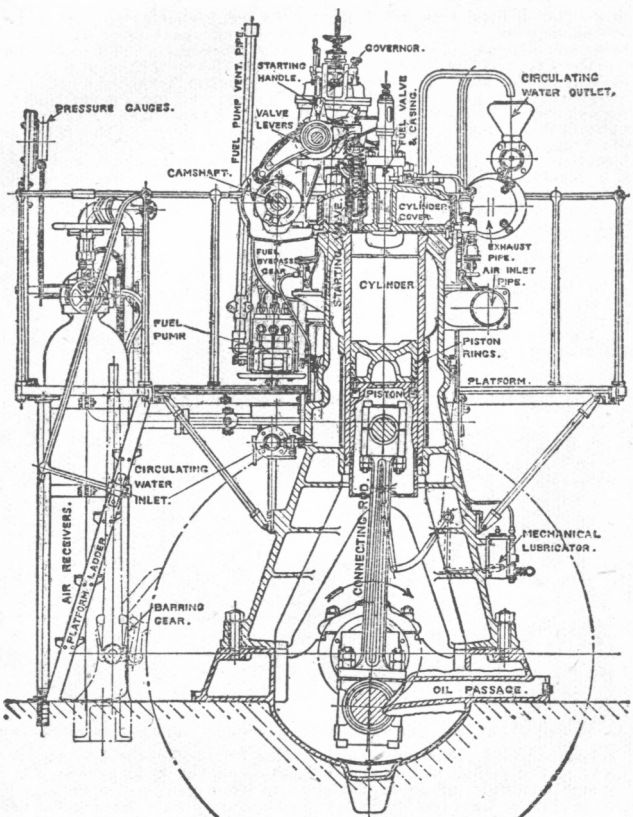


Fig. 5. Section of Mirrlees-Diesel engine (Mirrlees, Bickerton, & Day Ltd.)

is 800 feet per minute. The cylinder heads contain, as usual, the valves, which are as follows: (*a*) the air starting valve; (*b*) the relief valve; (*c*) the fuel-injection valve; (*d*) two combined inlet and exhaust valves; (*e*) two 'director valves.' The director valve is an ingenious device which would enable one combined inlet and exhaust valve only to be used if this were considered desirable. The following description of one of the pair of combined valves will be sufficient. One end of the port opens through the cylinder head into the cylinder, and the other end into a two-way passage, one the air-passage and the other the exhaust-passage. The director valve closes one or other of these passages, leaving the one not closed in connection with the cylinder. An ordinary mushroom valve closes the end of the cylinder-head port entering the cylinder (*see* fig. 10).

The sequence of operation of these valves is evident. Though one of these combined valves would be thoroughly sufficient, two are used for practical reasons. The fuel-injection valve is of the 'needle' type, and has no packing

gland. The pressure of the compressed-air supply for fuel injection is about 1,000 pounds per square inch. For reversing the engine double cams are provided, one set for 'going ahead' and one for 'going astern,' but instead of moving the cam shaft bodily, the cam rollers only are moved to register with their respective cams. The engine is started on compressed air at 300 pounds per square inch pressure in the following sequence: 6 cylinders on air,

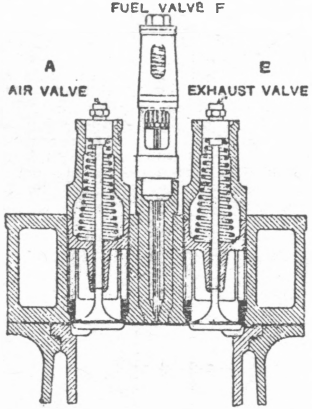


Fig. 6. Details of valves (Mirrless, Bickerton & Day, Ltd.)

3 on air and 3 on fuel, and 6 on fuel. During a six-hour full-load trial the following results were obtained with a Beardmore-Tosi engine: i.h.p., 1,766; b.h.p., 1,332; r.p.m., 129·6; mechanical efficiency, 75·5 per cent; mean

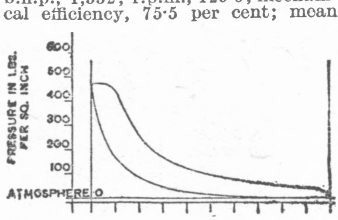


Fig. 7. Indicator Diesel Engine (Mirrless, Bickerton & Day, Ltd.)

effective pressure, 76 pounds per square inch; fuel consumption, 0·411 pounds per b.h.p. hour; blast-air pressure, 1,030 pounds per square inch.

Design. The details of high-speed petrol-engines are quite different from those of low-speed gas- or oil-engines, so much so that few gas-engineers are equally facile in designing either type. For detailed information the special treatises must be consulted, but the following *general principles* govern the design of both classes.

1. The Admission of Fuel. The gas for a gas-engine is led from the

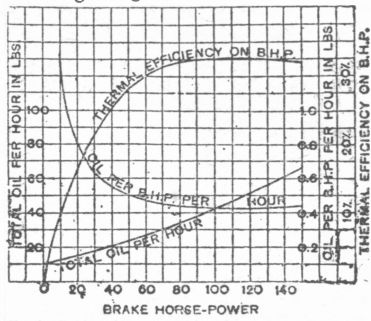


Fig. 8. Performance curves for Crossley (Otto) Oil-engine of 117 b.h.p. (Oct. 1918; test by Burstall)

mains by a pipe leading to the breech of the engine. In oil-engines the fuel falls to the vaporizer level, or may be injected by a pump. This latter arrangement is used in the Diesel engine. The pump delivers oil at a pressure of from 640 to 1,000 pounds per square inch to a fuel-injection valve (fig. 6), through which it passes as a spray into the cylinder and burns

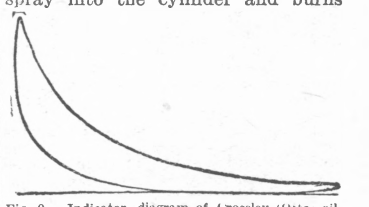


Fig. 9. Indicator, diagram of Crossley (Otto) oil-engine

gradually, thus maintaining a constant pressure in the cylinder during the first part of the expansion. A pump can be used as a means of governing the engine (*see* fig. 11). With light oil-engines working on the Otto cycle, or with petrol-engines, a carburettor is used to vaporize the petrol. The mixture of petrol-vapour and air is drawn into the engine as in a gas-engine. A common carburettor is shown in the article MOTOR-CAR ENGINES.

2. The Ignition of the Charge. The charge is usually ignited by causing a correctly-timed electric spark to take place in it. The spark is generated by a *magneto* (q.v.) or by an *induction*

coil (q.v.), with one or two accumulator cells (*see* SECONDARY CELL). The ignition is sometimes done by an ignition or hot tube. A tube which is kept nearly red-hot has 'controlled access' to the cylinder. At the moment when ignition should take place

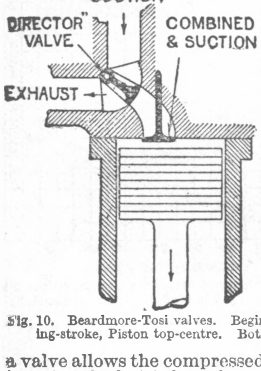


Fig. 10. Beardmore-Tosi valves. Beginning of Firing-stroke, Piston top-centre. Both closed.

a valve allows the compressed mixture to enter the hot tube, where it ignites and explodes.

These remarks apply only to engines working on the constant-volume principle (Otto cycle). In the Diesel engine the fuel is self-igniting, the temperature at the end of compression being high enough to ignite the fuel, and it burns relatively slowly.

3. Cooling the Combustion Chamber and Cylinder. The temperatures reached during explosion and combustion are very high, and the cylinder and combustion chamber must be kept cool. Water is used for this purpose, and is circulated round the cylinder and combustion chamber as seen in figs. 3 and 5. Such a cylinder is described as being 'water-jacketed.'

4. Mechanical Design. In the four-stroke, single-cylinder engine energy is supplied to the engine during one stroke out of four. The twist applied to the crank shaft is therefore very irregular. On the other hand, the demand for energy by the 'load' is usually fairly constant, so that the engine has to be fitted with a large fly-wheel to act as a reservoir of energy. During the explosion stroke the fly-wheel speeds up a little, and during the following three strokes its speed falls. The ratio of the extreme variation of speed to the mean speed is called the 'cyclic irregularity.' It is about 4 per cent for ordinary engines, but must be less than 0·7 per cent for gas-engines to drive alternators in parallel. One great advantage of a multiple-cylinder engine is that the twist applied to the crank shaft can be kept much more uniform, and therefore a smaller fly-wheel can be used.

The problem of *balancing* the parts of the engine and providing for uniformity of twist as far as possible is perhaps the principal problem of the mechanical design. Uniformity of twist is approached by the use of more than one cylinder and of a two-stroke cycle. The simplest case of balancing occurs in the fly-wheel. If it is light on one side, an additional mass is attached to one of the spokes or the rim on the other side, so that the resultant centrifugal force is zero, and the bearings only have to take the dead-weight of the fly-wheel. The piston should be balanced as far as possible, but this is a more difficult problem as it has a reciprocating motion. It cannot be completely balanced in a single-piston engine. In Fullagar's engines the pistons are

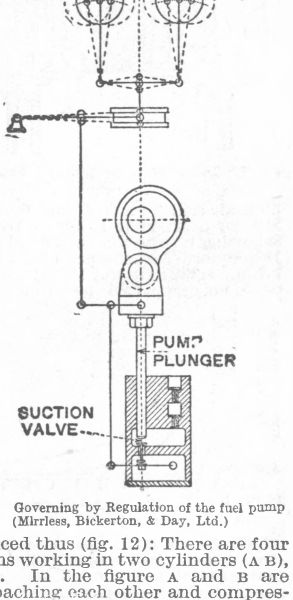


Fig. 11. Governing by Regulation of the fuel pump (Mirrless, Bickerton, & Day, Ltd.)

balanced thus (fig. 12): There are four pistons working in two cylinders (A B), (A′B′). In the figure A and B are approaching each other and compressing the charge in *c* while A′ and B′ are receding from each other under the explosion in E. A is coupled to B′ and B to A′ by means of oblique rods.

The inertia force of A exactly

balances that of B'; similarly with B and A'. Further, an explosion takes place during every half-revolution in such a two-cylinder engine, so that the twist applied to the shaft can be made nearly uniform by using three of these two-cylinder elements on one crank shaft. The crank shaft and fly-wheel are therefore relatively light.

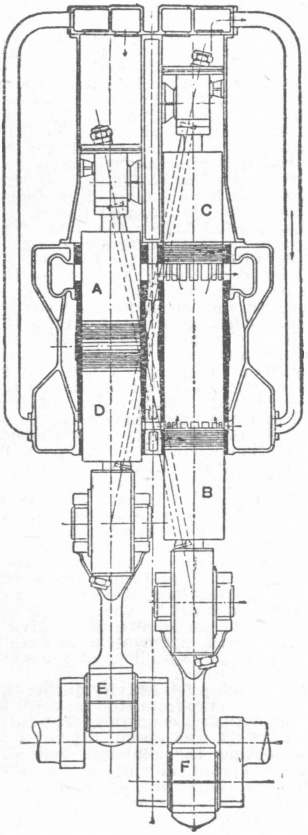


Fig. 12. Arrangement of cross-connected pistons in Fullagar's engine

The connecting-rods are the most difficult parts to balance, theoretically. As a first approximation, it is usual to replace the rod by a massless one, and to add a mass m_1 to the cross-head, and a mass m_2 to the crank pin, where $m_1 + m_2 = M$, the total mass of the rod, and m_1, m_2 are in inverse proportion to the distance of the centre of gravity of the rod from either end.

Governing contrivances are fitted to the engine to ensure that it runs as nearly as possible at constant speed

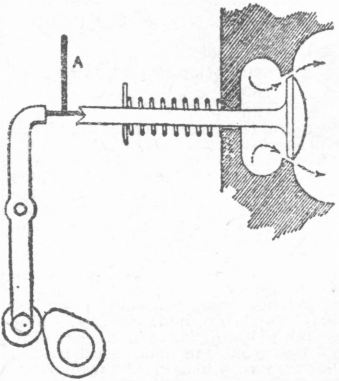


Fig. 13. The 'Hit-and-miss governor principle

under varying conditions of applied load within the capacity of the engine. The speed of the engine is brought into play just as in the steam-engine, namely, by the variations in the centrifugal force on a pair of rotating balls. For instance, when the speed rises, the balls (fig. 11) fly outwards and the fitting A moves upwards, and vice versa. The movements of this fitting A are used to control the engine in the following ways: (1) by cutting off the whole of the fuel-supply for one or more cycles; (2) by reducing the amount of fuel used per cycle, leaving the air-supply untouched; (3) by reducing the amount of both fuel and air, keeping the proportion of fuel to air the same, or by causing the ignition to come later, or to be cut off altogether.

The first of these arrangements is a very common one, and is called the 'hit-and-miss' principle. It is illustrated in fig. 13. The position of the part A is controlled by the governor. Motor-car engines are usually governed by hand by means of the throttle.

Fuel Consumption. The gas consumption of a gas-engine varies a great deal with the load, the nature of the gas, i.e. its calorific value, &c., and the size of the engine. Roughly speaking, the brake horse-power efficiency ranges from about 20 to 33 per cent, the smaller value being for small engines on full load or large engines on light load. From these figures an estimate can be made of the approxi-

mate gas consumption; for instance, if we take a 30-b.h.p. engine working on town gas at a calorific value of, say, 500 B.Th.U. per cubic foot, we get for the gas consumption in 1 hour,

$$\frac{30 \text{ (b.h.p.)} \times 2545 \text{ (B.Th.U. in 1-h.p. hour)}}{0.20 \text{ (efficiency)} \times 500 \text{ (calorific value)}} = 763 \text{ c. feet,}$$

i.e. a consumption per b.h.p. hour of

$$\frac{763}{30} = 25{\cdot}4 \text{ c. feet,}$$

assuming the engine is running at full load at a brake efficiency of 20 per cent.

The higher efficiency of 33 per cent is reached in engines of some 2,000 b.h.p. For oil-engines a fairly representative figure is ½ pound of oil per b.h.p. hour, though this figure, like the corresponding figure for gas-engines, varies a great deal with the size of engine, the relative load, nature of oil, and so on. A reasonable figure for petrol-engines is about ¾ pound of petrol per b.h.p. hour, or, say, ⅜ pint per b.h.p. hour. These figures are only given as guides in general estimates; they may vary in as great a proportion as 2:1, depending on the circumstances of each case.—BIBLIOGRAPHY: A. W. and Z. W. Daw, *Oil and Gas Engine Power*; A. P. Chalkley, *The Diesel Engine*; G. Supino, *Diesel Engines* (translated by A. G. Bremner and J. Richardson); H. R. Ricards, *The Internal Combustion Engine*; A. W. Judge, *The Testing of High-Speed I. C. Engines*; G. A. Burls, *Aero-Engines*. For details of actual engines, *see* Makers' Literature.

INTERNATIONAL TRADE UNION, political organization of the workers on an international basis (*see* INTERNATIONAL, THE SOCIALIST) has been accompanied during the last 30 years by efforts to unite the trade unions in an international organization. Trade unionists were active in forming the First and Second Internationals, but they did not contemplate a separate Trade Union International until the beginning of the present century; although a tentative effort was made in 1888, at the instance of the British Trades Union Congress, to promote international trade union co-operation on specific questions. The French trade unions took the initiative in 1900 in proposing the formation of an International Labour Secretariat, but no real progress was made until the following year, when at an international congress in Copenhagen the suggestion of an annual international meeting of trade union representatives was approved and the German Trade Union Centre became the international headquarters with Karl Legien, then president of the German trade union movement, as its secretary. International congresses were held from that time onwards every year (with some few exceptions) until the outbreak of war in 1914.

International Federation of Trade Unions. Up to the War, however, the international trade union organization consisted of little more than a postal address in Berlin and an annual congress meeting in various European capitals. At the Paris Congress in 1909 a proposal to establish an "International Federation of Labour" was made by Samuel Gompers on behalf of the American trade unions, but nothing came of it until the 8th Congress at Zurich in 1913, when it was decided to call the organization the *International Federation of Trade Unions* (I.F.T.U.). During the War it lived a divided existence, between Amsterdam and Berlin.

Immediately after the War steps were taken, at a conference in Berne, 1919, to reconstitute the I.F.T.U. At a later congress in Amsterdam the same year the organization took shape, the most important internal change being the disappearance from it of the (British) General Federation of Trade Unions and the appearance in its councils of the British T.U.C. Up to the War the T.U.C. had allowed the international relationships of the British trade union movement to be carried on through the General Federation of Trade Unions (q.v.). In the reconstituted I.F.T.U. the T.U.C. took its rightful place and a member of its General Council, Mr. J. H. Thomas, became president of the International; vice-presidents, a full-time secretary, and two assistant secretaries (of different nationalities) were appointed; and the offices of the secretariat were located in Amsterdam. Twenty countries were affiliated through the national centres, giving the I.F.T.U. an aggregate membership of more than 23 millions at the start of its new career.

Membership fell heavily during the economic slump from 1921 onwards in all the affiliated countries. The total for 1932–33 was about 13¾ million, representing the affiliated national centres of practically all the European countries; important countries outside the Federation include the United States of America, Soviet Russia, Australasia, and most of Latin America.

Red International of Labour Unions. As with the international Socialist organization, there is a rival Trade Union International formed under Communist influences. It is called the Red International of Labour Unions (R.I.L.U.), and was formed at Moscow in 1921; originally it was intended to

make it an organic part of the Third (Communist) International and provision was made for interchange of delegates between the executives of the two bodies; but in 1922 this provision was abrogated at the instance of the French section, supported by the syndicalists of other countries. The R.I.L.U. claims affiliated groups in about 30 countries; but its aggregate membership is hardly more than half that of the I.F.T.U., its largest national affiliation being, of course, the entire Russian trade union movement. Its policy is avowedly Communistic, and it has carried on a bitter disruptive campaign against the I.F.T.U., with the assistance of subsidiary national organizations such as the National Minority Movement in this country.

Trade Union Secretariats. In close connection with the International Federation of Trade Unions there are in existence a large number of International Trade Secretariats, of which there are at present (1933) 39. These trade secretariats represent the unions in particular trades and industries (e.g. the metal workers, transport workers, woodworkers, garment workers, &c.). Proposals are under discussion for promoting still closer relations between them and the I.F.T.U.—BIBLIOGRAPHY: (I.F.T.U.), *Twenty-five Years of International Trade Unionism*, Sassenbach; *Labour Year Book*, 1924; Losovsky, *World's Trade Union Movement*; Tomsky, *Getting Together*.

INTERNATIONAL, THE SOCIALIST. The first attempt at the international organization of the Socialist and Labour movement was the 'International Association of Working Men,' founded in London in 1864 under the leadership of George Oder, George Howell, W. R. Cremer, and, among others, Karl Marx, whose inaugural address ended with the slogan "Proletarians of all countries, unite!" Marx was also responsible for the provisional rules. The Association was definitely revolutionary, but not at first definitely socialist; its aim was the conquest of power by the proletariat. The part played by the Association in the Paris Commune led to the withdrawal of some of the most prominent of the British trade unionists and to exceptional legislation against its members in France; but the Association was finally shattered by differences between its socialist section, led by Marx and Engels, and the anarchist elements, led by Bakunin. Its last European Congress was held at Geneva in 1873. Its head-quarters were moved to America, where, in 1876, it was dissolved.

The attention of European Socialists was concentrated in the decade that followed on the building up of strong national parties as the necessary prelude to an effective International. From 1889 onwards international Socialist congresses were held at intervals of two or three years; but the organization was little more than a loose tie holding the national parties together and had no real centre until in 1900 the International Bureau, with an executive council and a central office was established, its first secretary being Victor Serwy, who was succeeded in 1905 by Camille Huysmans. At the 1900 Congress in Paris the terms of participation were defined so as to include only groups, striving for the attainment of socialism, which admit the need for parliamentary activity, and trade union organizations which, though not participating in the political movement, recognize the need for such activity. At this Congress the International Socialist Bureau was set up as the secretariat and organizing centre of what has since come to be known as the Second International.

The Second International was practically destroyed by the European War. Its attitude towards war was to have been the subject of discussion at the Vienna Congress in 1914, but the War came before that congress met. The International fell to pieces owing to the necessity of the national parties, particularly the German and French, having to decide without any opportunity of discussion with one another, the question of voting war credits. During the War the Secretariat remained in existence, first at the Hague, then at Stockholm, and then in London, endeavoured to preserve contact with the parties in all the belligerant countries. It assisted to promote the Inter-allied conferences in 1915, 1917, and 1918, at which Socialist War Aims were formulated, and was active in endeavouring to arrange a full international congress at Stockhom when the Russian Revolution of 1917 changed the whole situation for the Socialist parties. The Second International resumed its work after the Great War, its first meeting being at Berne in 1919, convoked by a committee of Allied Socialists, when preliminary discussions were held with a view to reconstituting the organization, but it was not until 1923 that the Second International was completely re-established.

The 'Third' or Communist International, founded at Moscow in March, 1919, was the outcome of the conferences held at Zimmerwald (Sept., 1915, and Kienthal (April, 1916) by Socialist parties and groups opposed to the war. Its second Congress (Moscow,

July–Aug., 1920) drew up the Constitution of the Communist International, and laid down twenty-one conditions of membership, of an exceedingly uncompromising character. The aim of the Communist International, as defined in its Statutes, is "to organize an armed struggle for the overthrow of the international bourgeois and the establishment of an International Soviet Republic as a transition to the complete abolition of the capitalist state." The Statutes require the exclusion from the affiliated national parties of all members who support a 'reformist' policy of political co-operation with capitalist parties; "such avowed reformists" as Turati, Modigliani, Kautsky, Morris Hillquit, Jean Longuet, and Ramsay Macdonald "cannot be tolerated." War is declared on "the Yellow Amsterdam International of Trade Unions." Resolutions of the Communist International or its executive are binding upon affiliated parties: "the Communist International, operating in a period of acute civil strife, must be centralized in a more effective manner than was the Second International." Sections of the Socialist movement in France, Germany, Britain, Holland, Belgium, Czechoslovakia, Scandinavia and other countries were affiliated to this Communist International, but its composition, aims and rules are such that large numbers of European Socialists who had left the Second International were not prepared to accept.

A Congress of the sections thus left without international affiliation met at Vienna in Feb., 1921, and formed an 'International Working Union of Socialist Parties,' with the object of recreating an International inclusive of all Socialist parties. The British Independent Labour Party, the French Socialist Party, the German Independent Socialists, the Austrian, German-Czech, Hungarian, and Swiss Socialist Parties, and the Russian Mensheviks and Social Revolutionaries took part in the Congress. The Vienna Union (known for a time as the Two-and-a-Half International) hoped to find a basis of agreement with the Labour and Socialist International (L.S.I.) and the Communist International, and for a time the Vienna groups dallied with the notion of forming a Fourth International; but they found in 1922 that the 21 conditions laid down by the Communists were completely unacceptable, and thereupon they re-established relations with the L.S.I. (*See also* TRADE UNION INTERNATIONAL.)—BIBLIOGRAPHY: Max Beer, *History of British Socialism*; Stekloff, *The First International*; *Labour Year Book*, 1919–1924, Dult, *The Two Internationals*; Th. Kirkup, *History of Socialism*; Villetard, *Historie de l'Internationale*; E. Laskine, *L'Internationale et le Pangermanisme*.

INTERNATIONAL LABOUR LEGISLATION. The development of international Labour legislation springs from recognition of the fact that "the failure of any nation to adopt humane conditions of labour is an obstacle in the way of other nations which desire to improve the conditions in their own country." These are the words of the preamble to the Labour sections of the Versailles Peace Treaty.

The regulation of the conditions of labour is welcomed by the better employers as preventing forms of competition which they rightly shrink from adopting. With the growth of this regulation it was, however, realized that it is not sufficient that it shall be national; evil conditions removed in one country may handicap its industries in competition with foreign rivals. Opinion thus grew in favour of international regulation, and the movement towards this was strengthened as trade unions developed international organization.

The earliest initiative was taken by the Swiss Federal Government in a circular letter sent in 1881 to the various industrial countries of Europe. It was, however, not favourably received. In 1885 the German Social Democrats demanded that their Government should take steps to further the international establishment of the ten-hour day, and prohibition of night-work and of the employment of children under fourteen. A second circular letter sent out by the Swiss Government in 1889 met with more success, and an International Conference was held in Berlin in March, 1890, which made recommendations in regard to work in mines, Sunday work, and children's, young people's, and women's employment.

In 1900 a Congress took place in Paris to establish an International Association for Labour Legislation. The Association was constituted in Basel in 1901, and devoted its attention in the first place to inquiries into the industrial night-work of women and into the dangerous industries, notably those using lead and white phosphorus. On its instigation the Swiss Government called an International Conference at Berne in 1905, as a result of which the Berne Conventions of 26th Sept., 1906, were drawn up prohibiting the industrial employment of women at night, and the use of white phosphorus in the manufacture of matches. This material had been responsible for one of the most terrible industrial diseases, phosphorus

necrosis or 'phossy jaw.' A number of countries adopted the conventions at once, and, owing to the energy of the national sections of the Association, they are now observed by practically all civilized countries. The Berne conventions initiated a whole series of international labour laws, and laid down the principles upon which the International Labour Organization is now based.

Under the Versailles Treaty an International Labour Organization was set up as a constituent part of the League of Nations, to promote the regulation of working hours, the prevention of unemployment, the 'living wage,' protection against sickness and accident, the protection of women and children, and labour protection generally on international lines.

The organization consists of a General Conference, a Governing Body, and an International Labour Office (I.L.O.). The General Conference is composed of two Government representatives, together with one representative of employers and one of labour, from each country. The Governing Body of twenty-four members is similarly composed of Government, employers', and workers' representatives; it controls the I.L.O., and prepares for the meetings of the General Conferences. The I.L.O. is the secretariat of the organization. The I.L.O. is not merely a section of the League of Nations, or a part of its permanent secretariat, but a largely autonomous body with power to initiate and carry out its own policy.

The General Conference met in 1919 at Washington, and adopted conventions concerning the eight-hour day, unemployment, and the employment of women and children; this was the beginning of a series of annual conferences, held mostly at Geneva, at which conventions on a variety of subjects were framed. The conventions adopted are intended to be made the basis of Government action by the members of the League, and while the League has not even nominal power to compel such action, it may at least be hoped that the conventions will stimulate the international levelling-up of the conditions of labour; 33 Conventions have been adopted, and ratifications registered up to March, 1933, totalled 502, representing 50 new ratifications within the year, a larger number than in any year since 1925 (with the single exception of 1929, when 79 ratifications were registered). The convention that has received the largest number of ratifications is that dealing with the working of heavy weights. Among the countries which have ratified conventions Spain leads the way with a total of 30. The most important discussions now proceeding concern the fixing of hours of work in coal mines, and the proposal to establish an international 40-hour week for all industrial workers.

In addition to the work of framing conventions, the I.L.O. issues periodical information regarding industrial and social conditions in all the countries of the world, and a valuable series of monographs on technical aspects of social and industrial policy, as well as a regular series of national industrial laws as passed by various countries.

—BIBLIOGRAPHY: *Annuaire de Législation de Travail* (issued by the Belgian Office de Travail); *The Labour Year Book*; H. J. W. Hetherington, *International Labour Legislation*; *Labour as an International Problem*, (a series of papers by acknowledged authorities); Behrens, *The International Labour Office*; G. N. Barnes, *History of the International Labour Office*.

INTERNATIONAL LAW may be defined as the rules acknowledged by civilized states to be binding upon them in their mutual relations. Clearly before nation states arose international law was an impossibility. In the Middle Ages states, as we know them to-day, or as the ancients knew them, hardly existed. At that time international law was dim, consisting only of a few maritime conventions governing trade in the Mediterranean or the Baltic, or of customs controlling the treatment of emissaries sent by one King to another.

During the Crusades we hear of 'consuls' representing European interests in Turkey, Palestine, or the Levant, but little is known of their functions or their privileges. At the Renaissance the great modern states arose. In thinking out a system of regulation for the necessary business which they did with each other, Hugo Grotius won the title of 'the father of international law.'

Great as was the ingenuity and practical sense of Grotius, neither he nor other writers gave to posterity an all-sufficient code. It is roughly true to say that the history of international law since his day falls into two, or possibly three, periods. The first may be termed the *period of competition*. Its most characteristic features are to be seen in the sixteenth, seventeenth, and eighteenth centuries. Throughout, the relations of States are determined by the dynastic principle and the maintenance of the balance of power. Did Louis XIV, or Napoleon, or any other monarch, or republic, aim at the domination of the rest, a force, formed by the combination of a group of States more powerful, prevented it. In the balance of power

theory, while there was something commendable, in the sense of curbing the ambitions of States, its practice led to the grouping of States in rival camps and to a precarious equipoise which broke down in the appalling disaster of the Great War. But it did preserve peace on many occasions, and it did give time for international practice to develop on normal and sound lines, crystallizing, as it did so, into international law.

This was the time of many international treaties, establishing practices which have since then gone unchallenged. This, too, was the hey-day of the prize courts, in which national judges sat administering international law on the various points of dispute inseparable from world-wide maritime warfare. The great English prize court judge, Lord Stowell (brother of Lord Eldon), gave, during the Napoleonic wars, several thousand decisions on maritime and mercantile matters. His unerring faculty for seizing on the true bearing of each problem presented to him, and his power of applying broad principles of law to every possible circumstance, have resulted in the fact that nine-tenths of his decisions have remained unchallenged since his days, even in other countries.

With the fall of Napoleon began the second period, which may be termed the *co-operative* period, in which the nationalistic states arose and democratic and parliamentary methods were developed. The chief features of this period are the holding of congresses and the development of international law by something analogous to legislation. Thus the Powers met to reconstruct Europe at Vienna in 1815. The Congress of Paris, 1856, not only settled the political questions which arose out of the Crimean War, but came to an agreement on questions of law, as, for instance, the conduct of blockades, which had divided the nations for centuries.

The Hague Peace Conferences (1899 and 1907) agreed upon fourteen conventions, regulating the conduct of war on land, and also established a Permanent Court of Arbitration. This was neither 'permanent' nor 'a court'; but merely a panel of judges (four being nominated by each of the signatories) from which nations desirous of arbitration can choose their arbitrators. During the years of its establishment until 1914 the court made fourteen awards.

The Hague Conferences were followed by the Conference of London, resulting in the making of rules for warfare by sea and a proposal to establish an international prize court. These agreements were embodied in an abortive document known as the Declaration of London which was never ratified by any of the signatories to it.

Then came the European War. Many international conventions were broken by both sides and it seemed to some as if International Law were a useless pretence. But more thoughtful persons have pointed out that the real moral to be drawn from the late war is that war and law are incompatible. Ever since the time of Grotius, international lawyers have devoted much attention to regulating warfare, but when war has come the claims of national security have always successfully overridden international law. Moreover, nations are inclined to regard as law what will be most convenient to themselves. Thus the great military states have always maintained that war is purely an affair between combatants and punish with great severity any interference by the civil population. Both Britain and the United States have differed, notably in asserting the right to arm their merchantmen.

Since the late war several valuable efforts have been made against the recurrence of war. The most important of these was undoubtedly the signature in 1919 of the Covenant establishing the League of Nations. Among the Articles of the Covenant we may note Article XII, which provides for the settlement of all disputes between members of the League either by arbitration or by their submission to the Council of the League. Article XVIII requires all treaties between members to be registered with the Secretariat. Article XIX enables the revision of treaties likely "to endanger the peace of the world" and Article XXII deals with mandated territories. Since then there have been many highly important developments in international law, touching such matters as inland water-transport, migration, the protection of racial minorities, international labour legislation (q.v.) as well as treaties, pacts, &c., concerning armaments and the maintenance of peace.

An important step in preserving international peace was taken when in December, 1920, the Permanent Court of International Justice was established. This court exists in addition to the Arbitration Court established by The Hague Conferences. The judges are not chosen by the parties in dispute, but are elected by the Council and Assembly of the League and the court is the first true international court.

No fewer than 7 treaties, dealing with questions of naval disarmament and with political problems in the

Pacific issued from the next important stage in the development of international law, viz. the Washington Conference of 1921, Mention must be made, too of the signature of the 27th August, 1928, of a Peace Pact by fifteen nations, including Great Britain, the United States, and all the principal European powers. By this document the signatories "condemn recourse to war . . . and renounce it as an instrument of national policy", and agree that the "solution of all disputes . . . shall never be sought except by pacific means." In 1932 the World Conference on Disarmament convoked by the League of Nations began its task of framing a general treaty for the limitation and eventual abolition of all armaments on land, sea and air; its progress has been slow but in the early months of 1933 a draft treaty was submitted by the British Government, on which the conference is now trying to get agreement. One of the results of this conference was the framing of a new Four-Power-Pact, by which Gt. Britain, France, Germany, and Italy undertake mutual efforts, within the framework of the League of Nations to liquidate outstanding problems arising from the peace treaties and is held by its author, Mussolini, to guarantee European peace for the next ten years.

By such measures a fabric of international law is being slowly erected, but the world is still a long way from accepting in international relations the same ideas of law that govern the relations of individual citizens in civilized states.—BIBLIOGRAPHY: L. F. L. Oppenheim, *International Law* (4th edition by A. D. McNair); Sir Geoffrey Butler and Simon Maccoby, *The Development of International Law*; T. J. Lawrence, *The Principles of International Law*; *British Year Book of International Law*; A. P. Higgins, *Hague Peace Conferences*; *Studies in International Law and Relations*; S. C. Rodick, *The Doctrine of Necessity in International Law*; Sir Geoffrey Butler, *A Handbook to the League of Nations*.

INTERPLEAD'ER, in law, the right or process by which a man who is called upon by two opposite parties to pay a sum or deliver over goods, and who is not sure which party is the rightful claimant, can call upon the parties to come forward as against each other, and so relieve him.

INTER'POLATION, in mathematics, a method whereby, when some numbers of a series are given, others may be calculated approximately. For example, the sun's right ascension being tabulated for every Greenwich noon, its value at any other time is found by interpolation. The same object may be attained, but with less accuracy, by means of a graph. If u_a, u_b are the values of a function u for $x = a$, $x = b$; and if u is a *linear* function of x, so that its graph is a straight line, then we have at once from a figure (*see* GEOMETRY)

$$u_x = u_a + \{(x-a)/(b-a)\}(u_b - u_a) \quad .. (1$$

Even when u is not a linear function of x, its graph between $x = a$ and $x = b$ may not deviate far from the straight line joining the points (a, u_a), (b, u_b); and the formula (1) may still be applied. It is often referred to as the *principle of proportional parts*. The formula may be written $u_x = u_a(x-b)/(a-b) + u_b(x-a)/(b-a)$. This is the simplest case of *Lagrange's interpolation formula*; the next case is $u_x = u_a(x-b)(x-c)/\{(a-b)(a-c)\} +$ two similar terms with a, b, c cyclically interchanged; it may be verified immediately that, when $x = a$, the formula gives $u_x = u_a$; and similarly for $x = b$ and $x = c$. Two important interpolation formulæ are given under DIFFERENCES, FINITE.

If the value of x for which u is required does not lie *between* the extreme values for which u is given, the process, usually called *extrapolation* in this case, is not so reliable.

INTERREGNUM (Lat. *inter*, between, and *regnum*, rule) is the name given in Roman history to the interval which elapsed between the death of a king and the election of another. The official holding the power during this interval was called the *interrex*. The great Interregnum in mediæval history is a name given to the period between 1254 and the election of Rudolf of Habsburg in 1273. It is often called the Age of Fist-law (*Faustrecht*). Germany had no ruler at that time who was generally recognized, and confusion reigned everywhere.

INTERROG'ATORIES, in English law, written questions put by one party in a civil cause to his opponent, by permission of the judge, in order to obtain evidence before the trial. The interrogatores must not be prolix, irrelevant, or oppressive; and answers may be refused on the ground that the information sought is privileged or may incriminate the party giving it.

INTERVAL, in music, the distance between two given sounds, or their differences in point of gravity or acuteness. Intervals are *simple* when confined within the octave, and *compound* when they exceed it, and are named according to the distance of the two boundary notes. Thus the interval of a whole tone (CD) is called a second, of a whole tone and a semitone (CE♭) a minor third, &c. All the

intervals of any major scale reckoning up from the key-note are *major*. Intervals a semitone less are *minor*. If they are a semitone greater than major, they are *augmented*; if a semitone less than minor, they are *diminished*. *See* MUSIC.

INTESTATE. Person who dies without a will. In such cases English law provides that the property shall pass according to certain rules. If a married man or woman dies, leaving a widow or widower, and there are no children, all the property passes to the surviving wife or husband. If there are children, the surviving husband or wife takes one half of the estate, dividing the rest equally among the children. If a child of the intestate has died leaving children, such children inherit their parent's share.

If an unmarried person, or a widow or widower, without children, dies, the property passes to the parents. If they are dead it passes to the brothers and sisters in equal shares, and if there are none, to more distant relatives. If there are no relatives the estate passes to the crown.

These rules date from 1925. Before that time the real property of an intestate passed to the eldest son, and the personal property to the widow or widower or children, the widow or widower receiving one-third. In 1925 the distinction between real and personal property was abolished.

INTESTINE (Lat. *intestinum*, from *intus*, within), the name given to the part of the alimentary canal that extends from the right or pyloric orifice of the stomach to the anus, and which receives the ingested food from the stomach, retains it for a longer or shorter period, mixes it with the bile, pancreatic juice, and intestinal secretions, gives origin to the absorbent vessels which take up the nutriment and convey it into the current of the blood, and which lastly, conveys the fæcal or indigestible products from the system.

In man it is usually divided into the *small intestine*, which comprehends the duodenum, jejunum, and ileum; and the *large intestine*, comprehending the cæcum, colon, and rectum. Three distinct coats are to be distinguished in the structure of the small intestine; these, named from without inwards, are known as the *serous*, *muscular*, and *mucous* coats. The innermost or mucous coat presents several interesting structures. Among these are the *valvulæ conniventes*, or closely-folded transverse plaits of the mucous membrane, the functions of which would appear to be those of serving materially to increase the digestive surface or area of the intestine, and thoroughly mingle the ingesta with the secretions.

The surface of the membrane is covered with innumerable fine projections termed *villi*, which give to it almost a velvety texture. Each villus is found under the microscope to be an outstanding process of the mucous membrane, containing internally an artery giving off minute ramifications, a vein by which the venous blood is returned, and, lastly, the lacteal or absorbent vessel. The function of the villi, which are most numerous in the duodenum, is pre-eminently that of the absorption of the chyle or fluid product of digestion, as a preliminary to its transmission to the current of the blood or circulation.

Four varieties of glands are also connected with the small intestine, the first three being named after their respective discoverers, Lieberkühn, Peyer, and Brunner, and the other variety occurring singly—the 'solitary' glands—and in groups—Peyer's patches. The exact functions of these bodies are not well known. The duodenum lies in the epigastric region, and makes three turnings, receiving by a common opening between its first and second flexure the bile-duct and the pancreatic-duct. The conversion of the chyme from the stomach into chyle is thus accomplished in the duodenum.

The jejunum, commencing at the left side of the second lumbar vertebra, becomes insensibly and gradually continuous with the ileum, which, terminating the small intestine, becomes continuous with the large intestine in the right iliac fossa, and opens into the *colon*, or first portion of the large intestine, which is divided from the large intestines by the ileo-cæcal valve.

Below the point at which the ileum opens into the colon we find a short blind sac continuous with the colon, and known as the *cæcum*; and attached to the lower extremity of the cæcum, and communicating with the cæcal cavity, we find a little closed tube, to which the name of *appendix vermiformis* or simply *appendix* is applied.

We next find the colon ascending in the right lumbar region, in front of the kidney. This portion is known as the *ascending colon*. It then crosses the abdominal cavity to the left side, and becomes the *transverse colon*; and finally descends as the *descending colon*, in front of the left kidney into the left groin, where, after making a curve like the letter **S**—*sigmoid flexure* of the colon—it terminates in the last portion of the intestinal tract. This last portion, known as the *rectum*, finally terminates in the anus.

The large intestine measures from 5 to 6 feet in length; the small intestine measures from 16 to about 24 or 26 feet in length; so that the entire intestinal tract may be regarded as being about five or six times the length of the body itself. The three coats of the small intestine are repeated in the large intestine. The mucous or inner coat is not elevated to form villi in the large, as in the small intestine, and only two kinds of glands, the glands of Lieberkühn, and the solitary glands, are to be distinguished in the large intestine.

The function of the large intestine is chiefly excretory, but a certain power of absorption is also exercised by its vessels. The food is propelled along the entire intestinal tract by the alternate contraction of the longitudinal and circular muscular fibres, by which means it is gradually pushed along the tube with a *vermicular* or *peristaltic* movement. The ileo-cæcal valve serves to prevent regurgitation of matters into the small intestine, after they have passed into the colon.

The *mesentery* is the term given to the fold of peritoneum by means of which the small intestines are attached to the spine. The blood-vessels supplying the intestinal tube are the *superior* and *inferior mesenteric arteries* and their branches, derived from the *abdominal aorta*. The veins of the intestines empty their contents into the *vena portæ*, which distributes itself through the liver, and from the blood of which the bile is secreted by the hepatic or liver cells. The nerves of the intestines are derived from the *sympathetic* or *autonomic system* of nerves, and have also a connection with the tenth cranial nerve—the vagus nerves.

INTUITION (Lat. *intueo*, to behold, gaze upon), in its narrowest sense, means, according to its etymology, an image in the mind acquired directly by the sense of sight, i.e. immediate knowledge in contrast with mediate, direct perceiving or beholding. The German term is *Anschauung*, and is used to signify any notion directly presented by an object of sense.

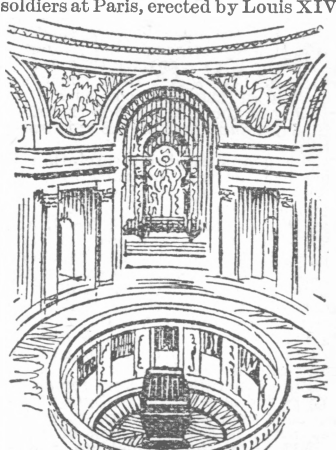
Kant distinguishes *empiric intuitions* (those conveyed by the senses from external objects) and *pure intuitions*, or intuitions a priori, which are the basis of the former, for instance, space and time; as nothing can be perceived by our senses except either in space or time, our notions of these must precede the empiric intuitions.

The term intuition is sometimes used in English philosophy to denote an a priori knowledge of first principles, a kind of spiritual instinct or inspiration which enables us at once to know the distinction between right and wrong, a knowledge 'derived by intuition.'

INTUSSUSCEP'TION (Lat. *intus*, within, and *suspicere*, to take up), in pathology, the descent of a higher portion of intestine into a lower one: generally of the ileum into the colon. When it takes place downwards, it is termed *progressive*; when upwards, *retrograde*.

IN'ULIN, a carbohydrate substance allied to starch, and taking the place of that compound as a reserve material in many Compositæ (e.g. Jerusalem artichoke) and in some other plants. It is present in a state of solution, but is readily precipitated by alcohol.

INVALIDES (aṇ-vâ-lēd), **HÔTEL DES**, a splendid hospital for disabled soldiers at Paris, erected by Louis XIV



Interior of Hôtel des Invalides, showing the tomb of Napoleon

between 1670 and 1673. A soldier must have served ten years to be received into this hospital on account of poverty or infirmity. In the vaults there lie the remains of Turenne, Vauban, and several other great French commanders, including those of Napoleon I, brought from St. Helena on 15th Dec., 1840, and placed in a porphyry sarcophagus in 1861.

INVAR, an alloy of steel and nickel, the invention of C. E. Guillaume, which has a very small coefficient of expansion. It is used in the construction of the finer measuring appliances employed in geodesy, for

clock pendulums, and other purposes where expansions must be small or easily compensated. In the silica lamp, which is of the mercury-vapour type with a quartz tube, the leading-in wires are made of invar in the same way as platinum is used for electric lamps with glass bulbs.

INVARIANT, in mathematics, a function which remains unchanged under specified transformations. The meaning of the term will be best seen from one or two simple examples. Let the quadratic function, or *form*, $ax^2 + 2hxy + by^2$ be transformed by the substitution $x = X\cos\alpha - Y\sin\alpha$, $y = X\sin\alpha + Y\cos\alpha$; where X, Y are the new variables. The function becomes $a(X\cos\alpha - Y\sin\alpha)^2 + 2h(X\cos\alpha - Y\sin\alpha)(X\sin\alpha + Y\cos\alpha) + b(X\sin\alpha + Y\cos\alpha)^2$. If we write this expression in the form $AX^2 + 2HXY + BY^2$, we have $A = a\cos^2\alpha + 2h\cos^2\alpha\sin\alpha + b\sin^2\alpha$; $B = a\sin^2\alpha - 2h\cos\alpha\sin\alpha + b\cos^2\alpha$, $H = (b - a)\cos\alpha\sin\alpha + h(\cos^2\alpha - \sin^2\alpha)$. We see at once that $A + B = a + b$. Now $A + B$ is the *same function* of the new coefficients as $a + b$ is of the old; $a + b$ is therefore called an *invariant* of the quadratic form.

The geometrical interpretation is very instructive. The transformation turns the rectangular axes through an angle α. The lines $ax^2 + 2hxy + by^2$ are at right angles if $a + b = 0$, and $Ax^2 + 2Hxy + By^2 = 0$ are at right angles if $A + B = 0$. The equations $a + b = 0$ and $A + B = 0$ express the same geometrical fact, and it is therefore not surprising that $a + b$ should be equal to $A + B$. Another invariant of the quadratic is $ab - h^2$. Its vanishing is the condition that the lines should be coincident.

More generally, in plane geometry, any curve is represented by a homogeneous equation in three variables, say $u = 0$; and an invariant of u is a function of the coefficients which, when equated to zero, expresses some intrinsic or inherent property of the curve, independent of co-ordinate axes. *Covariants* are functions, with properties similar to those of invariants, but involving the variables, x, y &c.

The theory of invariants and covariants is very extensive. Many analysts have helped to develop it, but its foundations were laid soundly and broadly by the great English mathematician Cayley.—BIBLIOGRAPHY: J. H. Grace and A. Young, *Algebra of Invariants*; G. Salmon, *Higher Algebra, Conic Sections*; W. S. Burnside and A. W. Panton, *Theory of Equations*.

INVERARAY (in-vér-ā'ri) a Scottish royal burgh, capital of the county of Argyle, formerly capital of West Highlands, beautifully situated near the head of Loch Fyne, 40 miles directly north-west of Glasgow, having the castle of the Duke of Argyll in the immediate vicinity. It unites with Ayr, Campbeltown, &c., in sending a member to Parliament. Pop. (1931), 455.

INVERCARGILL (-gil'), a town of New Zealand, county of Southland, province of Otago, situated near the mouth of the New River, about 150 miles s.w. of Dunedin. It is well built, and has an athenæum, hospital, public halls, street tramways, breweries, foundries, flour-mills, &c. The surrounding district is pastoral and agricultural. It is connected by rail with the port of Campbelltown, 17 miles distant and situated near the entrance to Bluff Harbour. Here there is excellent accommodation for the largest vessels at all states of the tide. Pop. (with suburbs), (1932), 24,350.

INVERFORTH, Baron. Scottish shipowner. Andrew Weir was born at Kirkcaldy, 24th April, 1865, and became a clerk in a shipping office in Glasgow, where he founded the business of Andrew Weir & Co., which became a large and flourishing firm. In 1917 Weir was engaged at the War Office with the supply of munitions to the forces. From 1919 until 1921 he was Minister of Munitions.

INVERGORDON, burgh and seaport of Ross and Cromarty, on Cromarty Firth, 13 miles from Dingwall, by the L.M.S.Rly. The chief industry is shipping. During the Great War it became a naval base and is still used for that purpose. Pop. (1931), 1,417.

INVERKEITHING (-kē'thing), a royal and police burgh (Stirling district) and seaport of Scotland, in Fifeshire. The battle of Inverkeithing between Cromwell's troops and the adherents of Charles II was fought on 20th July, 1650. It is now a central town for the Forth Bridge and for Rosyth Naval Base. Pop. (1931), 3,185.

INVERLOCHY, village of Inverness-shire on the River Lochy, 1 mile from Fort William. Here on Feb. 2, 1645, Montrose gained one of his victories. Sir W. Scott describes the battle in *The Legend of Montrose*.

INVERNESS', a royal and municipal burgh in Scotland, capital of the county of the same name, and chief town of the Highlands. It is beautifully situated, partly on low ground and partly on a gentle acclivity, on either side of the Ness, about a mile above its confluence with the Moray

Firth, near the end of the Caledonian Canal, and is a popular tourist resort.

The town is well built, among the chief edifices being the county buildings, a fine castellated structure, containing the court-house and jail; the town hall (a new building), the episcopal cathedral, the Highland Club, and the Royal Academy, besides several handsome banks and hotels. The Stone of the Tubs is the burgh's proudest possession.

The industries include shipbuilding, rope-making, tanning, distilling, and brewing, and there is a considerable trade. There is regular communication by sea and canal with Glasgow, Liverpool, Aberdeen, and Leith. Large vessels can unload at the quays. Inverness received a burgh charter from William the Lion in the twelfth century. Pop. (1931), 22,582.

INVERNESS, or **INVERNESS-SHIRE,** the largest county of Scotland, stretches diagonally across it from sea to sea, and includes on the west the Island of Skye, several smaller islands, and all the outer Hebrides, except the north of Lewis. Area, 2,695,094 acres, of which only about 100,000 are under tillage. Great part of the surface is barren heath, useless except for sporting purposes, but a considerable portion is suited for rearing cattle and sheep.

It is divided by Glenmore or the Great Glen of Albyn, which intersects it north-east to south-west, and through which passes the Caledonian Canal, formed by uniting a series of considerable lakes which stretch along the bottom of the valley. The south-west shores of the county are indented with numerous lochs or arms of the sea. The surface generally is mountainous, and presents much fine scenery.

Near the south-western extremity of the Caledonian Canal is Ben Nevis, 4,406 feet high, the loftiest mountain in Great Britain. The geological structure of the greater part of the county is of crystalline and metamorphic rocks, consisting chiefly of gneiss and mica-slate, with granite, porphyry, and trap rocks. The portion of the county bordering the Moray Firth is composed of Old Red Sandstone.

The principal rivers are the Spey, Ness, and Beauly, on all of which there are valuable salmon-fisheries. Some of the lakes are of considerable size, and beautifully situated. The largest is Loch Ness, forming part of the Caledonian Canal route.

Extensive tracts are held as deer forests, in which the red and roe deer roam at will. The arable and productive land lies chiefly on the sea-coast, and on the banks of the lakes and rivers. Gaelic is the prevailing language, about 5,000 persons speaking no other, and upwards of 36,000 being bi-lingual. Since 1918 Inverness-shire unites with Ross and Cromarty in returning three members to Parliament. Pop. (1931), 82,082.

INVERSION, a method of transformation of geometrical figures, which has useful applications in mathematical physics, as well as in pure geometry. Let O be a fixed point, P any point; and let P′ be taken in the line OP so that $OP \cdot OP' = k^2$ where k is constant. Then P′ is said to be the *inverse* of P with respect to the *centre of inversion* O; and k is called the radius of inversion. The *inverse of a curve* is the locus of the inverses of points on the curve. The inverse of a circle is a circle, unless the centre of inversion is on the original circle, in which case the inverse is a straight line.

By proper choice of centre and radius of inversion, an inverse of a figure may often be found simpler than the figure itself, e g. any two non-intersecting circles can be inverted into concentric circles. The point of the method is that a theorem or problem can be dealt with in the simplified figure, and then transferred to the original figure by a reinversion. It was by the method of inversion that Lord Kelvin, early in his career, found his wonderful solution of the problem of the distribution of electricity on a spherical bowl.—BIBLIOGRAPHY: J. Casey, *Supplement to Euclid*; J. Clerk Maxwell, *Electricity and Magnetism* (vol. i).

INVERSNAID, village of Stirlingshire, on the east side of Loch Lomond, and a calling place for steamers which meet the coaches here. The scenery around is very beautiful.

INVERTEBRATA, in zoology, a collective term for all animals not belonging to the phylum Vertebrata (Chordata), and therefore lacking the following distinctive characters. (1) Central nervous system tubular and dorsa. (2) An elastic supporting-rod, the *notochord*, underlies the nerve-tube in the embryo, but is usually more or less replaced by a vertebral column (backbone) in the adult. (3) Gill-pouches always present in the embryo, and persisting throughout life in fishes and some amphibia. (4) Heart ventral. (5) Not more than two pairs of limbs. (6) Jaws part of the wall of the head, and lower jaw, when present, moving up and down. (7) Reproduction sexual only.

Among higher invertebrates the heart is ventral; the limbs are often numerous; the jaws are modified limbs and move from side to side; and asexual reproduction by *budding* or

gemmation and by *fission* is common. Hard parts, when present, are in the form of an *exo-skeleton*, i.e. an external shell or test.

The most important phyla of invertebrates are: (1) Arthropoda, jointed-limbed animals, such as lobsters, insects, spiders, and centipedes. (2) Annelida, segmented worms, e.g. lug-worms, sea-centipedes, sea-mice, and earthworms. (3) Mollusca, shell-fish, as cuttle-fishes, snails, and bivalves. (4) Brachiopoda, lamp-shells. (5) Polyzoa, mostly colonial, as sea-mats and moss-polypes. (6) Nemathelmia, thread-worms and round worms. (7) Platyhelmia, flat worms, e.g. tape-worms and flukes. (8) Gephyrea, spoon-worms. (9) Nemertinea, proboscis worms. (10) Rotifera, wheel animalcules. (11) Echinodermata, hedgehog-skinned animals, e.g. star-fish, sea-cucumbers, and sea-urchins. (12) Cœlenterata, zoophytes, e.g. sea-anemones, corals, and jelly-fish. (13) Porifera, sponges. (14) Protozoa, animalcules.

INVERURIE, a royal and municipal burgh of Scotland, in Aberdeenshire, where the Urie joins the Don, included in the Elgin group of parliamentary burghs. It has railway-works and paper-works, and cattle markets are held. Pop. (1931), 4,524.

INVES'TITURE, in the feudal law, was the open delivery of a fee or fief by a lord to his vassal, thus, by external proof, affording evidence of possession; or the formal introduction of a person into some office or dignity. Investiture was usually performed by the presentation of some symbol to the person invested, as a branch of a tree, &c. The investiture of persons with ecclesiastical offices or dignities is historically the most important phase of the subject.

The estates and honours which composed the ecclesiastical temporalities were considered to partake of the nature of fiefs, and therefore to require similar investiture from the lord, but the symbols used for the investiture of bishops, the episcopal ring and the crosier or pastoral staff, were ecclesiastical in character, and, in the course of the revival of the power of the Papacy in the second half of the eleventh century, the Church forbade the practice as an infringement of the rights of the See of Rome. The consequent dispute with the lay power came to a head after Pope Gregory VII (Hildebrand) issued, in 1075, a decree against lay investiture of bishops, which he declared to be allied to simony.

In Germany the emperor, Henry IV, resisted the Pope, who allied himself with Henry's German enemies, and a long war ensued, in the course of which the emperor, in 1077, submitted to the Pope at Canossa. This did not end the quarrel, which was continued under the next emperor, Henry V, who in 1111 forced Pope Paschal II to abandon the claims of the Papacy, but the renunciation was withdrawn, and the struggle continued until 1122, when Henry V agreed on a compromise with Pope Calixtus II. By a concordat arranged at Worms, Henry V resigned for ever all pretence to invest bishops by the ring and crosier, and recognized the freedom of elections: the new bishop, however, was to receive his temporalities by the sceptre.

In England Paschal II had been engaged in a similar contest. Anselm, the Primate, refused to do homage to Henry I for the temporalities or feudal possessions of his see. The king asserted an unqualified right of investiture, which the Pope as unqualifiedly denied. After a protracted struggle the controversy ended in England, as it did afterwards in Germany, by compromise. Paschal offered to concede the objections against homage provided Henry would forego the ceremony of investiture. To this he agreed (1107).—Cf. A. C. Welch, *Anselm and his Work*.

Investiture also means the formal installation into an office; for example receiving a title or distinction bestowed by the King, such as Companion of Honour (C.H.), or the freedom of cities, honorary degrees at the universities, fellowships of learned societies, etc.

INVINCIBLES, a name applied to a certain section of the Fenians, or to persons of similar aims and reckless as to using extreme measures. It was by a band of these 'invincibles' that Lord Frederick Cavendish and T. H. Burke were murdered in Dublin in 1882.

IN'VOICE (Fr. *envoyer*, to send), an account in writing of the particulars of merchandise transmitted to a purchaser, giving price and quantity note of charges, and any other needfu details. By sending an invoice alon with goods a merchant gives officia advice to his correspondent of th understood terms of a contract. I the goods are received and the in voice retained, this will be held vali evidence in law of the contract.

INVOLU'CRE, in botany, a collec tion of bracts round a circle of flower In umbelliferous plants it consists c separate narrow bracts placed in single whorl; in many composit plants these organs are imbricated i several rows.

IO, in Greek mythology, t daughter of Inachus, the river god Argos and its first king. She w

beloved by Zeus, who, to protect her from the jealousy of Hera (Juno), changed her into a beautiful white heifer.

IODIC ACID, HIO_3, is obtained by heating iodine with concentrated nitric acid. It forms a colourless crystalline solid which is soluble in water, and a series of salts, the iodates, of which sodium iodate, occurring in Chile saltpetre, is the most important. On heating, iodic acid loses water, being converted into iodine pentoxide, which at higher temperature breaks up into iodine and oxygen.

I'ODINE (Gr. *ion*, violet), symbol, I; atomic weight, 127, is a non-metallic element belonging to the halogen group. It occurs in the form of metallic iodides in sea-water, from which it is extracted by certain sea-weeds, notably *Laminaria digitata* and *Laminaria stenophylla*, which may contain as much as 0·5 per cent of the element. It is also present in the form of sodium iodate in crude Chile saltpetre or caliche to the extent of about 0·2 per cent. The thyroid gland contains a small quantity of iodine.

In extracting iodine from sea-weed the dried weed is burnt, the ash or *kelp* boiled with water, and the solution concentrated until most of the common salt present has separated. The residual liquor containing the iodides in solution is then heated with sulphuric acid and manganese dioxide, the iodine which distills over being condensed in a series of cooled earthenware receivers.

From caliche, iodine is obtained from the mother-liquors remaining after the sodium nitrate has been separated by recrystallization. They are treated with sodium bisulphite, which precipitates the iodine in the solid state. The crude substance is purified by sublimation.

At the ordinary temperature iodine is a crystalline solid of greyish-black colour, having a high metallic lustre and a specific gravity of 4·95. It melts under pressure at 114° C. On heating in the air it sublimes, giving rise to a dense, pungent-smelling violet-coloured vapour, hence its name. It is very slightly soluble in water, more freely in alcohol and ether, and especially so in potassium iodide solution, forming brown solutions in each case; in carbon disulphide and chloroform the solution is violet.

In its chemical properties it resembles chlorine and bromine, but is less active. In combination it forms series of salts, the iodides and iodates being the most important. With starch, a deep blue coloration is produced, which serves as a characteristic test for iodine; a solution of one part in a million can be detected by this means.

Taken internally iodine acts as an irritant poison, but in small doses it is of service in the treatment of certain forms of glandular disease. Externally it is applied in alcoholic solution (tincture of iodine) as an antiseptic and as a counter-irritant and anti-parasitic. In the form of potassium iodide it has been found of great benefit in the treatment of goitre, scrofula, diseases of the liver and spleen, and in syphilitic affections, rheumatism, &c., as well as in lead poisoning.

Iodine is also largely used in the preparation of certain aniline colours and in other branches of technical chemistry.

Of its compounds, iodoform and iodol are used as antiseptics, and silver iodide enters into the composition of photographic films and plates.

IOD'OFORM, CHI_3, a substance analogous to chloroform, with iodine replacing chlorine. It crystallizes in small, yellow, hexagonal plates of melting-point 119° C., and is prepared by the action of alcohol or acetone on iodine and potash, or electrolytically; the latter method is used exclusively for its manufacture.

Iodoform is almost insoluble in water, but dissolves in ether, oils, and alcohol. It is used in medicine as an antiseptic, either dry or as an ointment. The strong odour of the substance renders its use as an antiseptic objectionable, and other iodine preparations have been introduced. Iodol (C_4I_4NH), for instance, is odourless, and is claimed to have the same antiseptic action as iodoform.

ION. Term applied in electrochemistry to electrically charged molecules or groups of molecules formed by the dissociation of an electrolyte. On electrolysis the kations and anions proceed to the cathode and anode respectively. The term is used also for the minute particles of a gas carrying electrical charges and produced under certain conditions, the gas becoming a conductor of electricity. *See* IONIZATION.

I'ON, an ancient Greek tragic poet, a native of Chios, who flourished in the age of Pericles. He wrote several tragedies, winning the third prize in 429 B.C. He also wrote comedies and dithyrambic and lyric poems, besides composing a history of the antiquities of Chios and an account of the visitors to that island. Only a few fragments of his work remain.

IO'NA, an island of Scotland, one of the Inner Hebrides, belonging to the

county of Argyle, separated from the south-west extremity of Mull by the Sound of Iona, 1½ miles wide, and about 74 miles south-west of Staffa. The name is believed to be a misreading of *Iova, Ioua*, a name that occurs in old MSS., but the most common ancient name was I, Y, Hy (or similar forms). It was also commonly called I-colm-kil or I-columb-kill, that is, 'isle of Columba's cell' or 'isle of Columba of the cell (or church).'

It is about 3 miles long by 1½ miles broad; area, about 2,000 acres, of which 600 acres are under cultivation, the remainder being hill pasture, morass, and rock. It derives its interest from its history and old ruins, the remains of religious establishments of uncertain date, but popularly attributed to Columba, who took up his residence here in A.D. 563. They are all, however, of a much more recent date.

The principal ruins are those of the cathedral church of St. Mary, of a nunnery, five chapels, and of a building called the Bishop's House. St. Oran's Chapel, as it is called, is supposed to be the most ancient; it is small, being only 60 feet by 20 feet. Attached to it is a burying-ground, in which various kings of Scotland, Ireland, and Norway are said to have found their last resting-place.

The cathedral, which was restored and reopened in 1905, is cruciform, surmounted at the intersection of the nave and the transept by a square tower of about 70 feet in height. The length of the transept is 70 feet, and that of the body of the church, east to west, 160 feet. The island is now easily reached in summer by steamers daily from Oban. Pop. 234.—Cf. F. M. Macneill, *Iona: a History of the Island with Descriptive Notes*.

IONIA, that part of the seaboard of Asia Minor which was inhabited by Ionian Greeks, a beautiful and fertile country opposite the Islands of Samos and Chios, which also belonged to it. According to tradition, the Greek colonists came over from Attica about the middle of the eleventh century B.C., and founded twelve towns, which, though mutually independent, formed a confederacy for common purposes. These included Phocæa, Ephesus, Miletus, &c., and afterwards Smyrna. Commerce, navigation, and agriculture early rendered them wealthy and flourishing, but the country was made tributary by Cræsus, King of Lydia, and later by Cyrus, King of Persia (557 B.C.).

With an interval of independence they remained under Persia until this empire was overthrown by Alexander the Great, 334–331 B.C., when they became a part of the Macedonian Empire. Ionia, at a later period, became part of the Roman province of Asia. It was afterwards totally devastated by the Saracens, so that few vestiges of its ancient civilization remain.

IONIAN ISLANDS, a number of Greek islands in the Ionian Sea, extending along the western and southern shores of Greece, of which the largest are Corfu, Cephalonia, Zante, and Cerigo, others being Ithaca or Thiaki, Paxos, and Santa Maura; area, 740 sq. miles. All are extremely mountainous; and were it not for the vine, olive, and currant, especially the last, they could support but a small number of inhabitants. The climate is more uniformly temperate and humid than the mainland. The staple exports are oil, currants, valonia, wine, soap, and salt. The few manufactures are chiefly textile and ornamental. The religion is that of the Greek Church.

The Ionian Islands often figure in the ancient history of Greece, but only singly. In 1386 Corfu voluntarily surrendered itself to Venice, and soon after the other islands placed themselves under its protection. In 1797 the French became masters. In 1809–10 they were occupied by British troops, and in 1815 the seven islands were formed into a republic, under the protectorate of Great Britain. They were transferred to Greece in 1864. Pop. about 213,157.

IONIC ORDER, one of the orders of classic architecture, the distinguishing characteristic of which is the volutes of its capital. In the Grecian Ionic (1) the stylobate consists of three receding equal steps the combined height of which is from four-fifths to a whole diameter; (2) the column, which includes band, shaft, and capital, is rather more than nine diameters in height, the shaft being fluted with twenty-four flutes and alternating fillets; while (3) the entablature is rather more than two diameters in height.

The volutes are connected on the flanks by a peculiar roll-moulding, called the *baluster* or *bolster*. In the *Roman Ionic*, a modification of the latter style, the stylobate is lofty and not graduated; the shaft diminishes one-tenth of a diameter and has twenty fillets and flutes; the capital, which is two-fifths of a diameter, has its volutes a little lower than the other, and a square abacus with moulded edges covers the whole.

The chief examples of the Grecian Ionic are those of the Athenian Acropolis; while those of the Roman Ionic are found in the temple of Fortuna Virilis and the Coliseum at Rome.

IONIC SCHOOL, the earliest school of Greek philosophy, a school which attempted to explain the phenomena of nature from the forces and attributes of matter itself. It taught the doctrine of the immediate unity of matter and life, according to which matter is by nature endowed with life, and life is inseparably connected with matter.

The matter, with which the Ionian philosophers are concerned, is not conceived by them as anything apart from spirit. They do not inquire into the questions concerning the distinction between mechanism and spirit. They are, however, clearly averse to anthropomorphic and mythological ideas and physical causation; matter and motion are for them manifestations of the absolute reality.

The originator of this school, and indirectly of Greek philosophy in general, was Thales, who flourished about 600 B.C. The other chief philosophers of the school were Anaximander, Anaximenes, Xenophanes, Heraclitus, and Anaxagoras. *See* the separate articles.—Cf. T. Gomperz, *Greek Thinkers*.

IONIZATION. This term was first used by Faraday to describe the process which certain substances known as electrolytes undergo when dissolved in water, and which causes the resulting solution to be a conductor of electricity. To explain the laws of electrolysis (q.v.) he assumed that the substance in solution was disintegrated into its constituent elements or radicles, each of which carried an electric charge. These charged atoms or radicles he called *ions*, and the process resulting in the formation of these ions he called *ionization*. The process is quite distinct from chemical decomposition, and the ions do not exhibit the chemical properties of the corresponding uncharged atoms or radicles.

The process may be regarded as follows. Taking common salt (sodium chloride) as an example, we suppose that the compound itself is formed by the passage of a negative electron (*see* ELECTRON) from the sodium atom, which is known to give up an electron very readily, to the chlorine atom, which has a strong tendency to absorb an electron. These tendencies are readily explained on the electron theory of the atom. The chlorine atom in the molecule of salt is thus negatively charged; the sodium atom is positively charged. The attraction between these opposite charges is the 'chemical bond' which binds the molecule together. Chemical combination of this type has been called *molecular ionization* by Sir. J. J. Thomson. On dissolving the salt in water the bond is in some way broken, and the atoms of sodium and chlorine separate, each retaining its own charge.

The exact cause of the ionization is not yet beyond dispute, but it may be pointed out that, owing to the high specific inductive capacity of water, the electrical force between the charged atoms in aqueous solution will only be about one-eightieth of the force in air, and thus the bond holding the molecule together is greatly weakened by solution. The attraction between the charged sodium ion and an uncharged molecule of the solvent may then be greater than that between the sodium atom and its associated chlorine atom, and the molecule will thus be broken up or ionized.

On applying an electric field to the solution, the charged ions, being acted upon by the field, will drift through the solution, the positive ions towards the negative electrode, the negative ions towards the positive electrode, with velocities which depend on the nature of the ion and the temperature and concentration of the solution.

Under given conditions the velocity is directly proportional to the strength of the applied field, and the velocity acquired under a field of 1 volt per centimetre is called the mobility of the ion. These mobilities are all small. Thus the hydrogen ion, which is the most mobile of them, has a velocity of only ·00325 cm. per second in a field of 1 volt per centimetre. The very large currents which can be transmitted by electrolytic solutions are due not to the speed of the carriers, but to their enormous number.

The term ionization is also applied to the process by which a gas is rendered conducting. Gases, under normal conditions, are almost perfect insulators. They can, however, be made temporarily conducting to a slight extent by subjecting them to the action of various agents, known as *ionizing agents*, of which the most important are X-rays, ultra-violet light, and the radiations from radio-active substances.

If an insulated conductor is given an electric charge and an X-ray tube is excited in its neighbourhood, the conductor rapidly loses its charge, and a similar effect is observed if a sample of any radio-active substance is brought near it. This is due to the formation in the gas of positively and negatively charged molecules, which by analogy with the phenomena of electrolysis are called *gaseous ions*. If there is an electric field in the gas, these gaseous ions will move in the field in a manner analogous to the motion of the ions in an electrolyte. Thus a positively charged conductor will attract the

negative ions, or a negatively charged conductor will attract the positive ions, until its charge is completely neutralized by the charges conveyed to it by the ions.

Similarly, if two electrodes, immersed in the gas, are maintained at a difference of potential, by being connected to the poles of a battery of cells, a current will be conveyed across the gas between the electrodes by the motion of the charged gaseous ions in the same way that a current is conveyed through an electrolytic cell by the motion of the electrolytic ions. Such an arrangement forms what is known as an *ionization chamber*. A convenient form of a ionization chamber consists of a pair of metal plates placed parallel to each other in the gas, and a few centimetres apart.

The process of ionizing a gas commences with the ejection of a negative electron from the molecule of the gas. When the ionizing agent is an α- or β-ray from a radio-active substance, the expulsion is due to collision between the particles which constitute the rays (*see* RAYS, ELECTRIC) and one of the electrons present in the atoms of the gas. In the case of X-rays, the strong electric field in the ray causes the ejection of a negative electron with such a high velocity that it acts like a β-ray, and produces a fresh emission of electrons from the atoms through which it passes.

The ionization by X-rays is thus mainly a secondary effect of the rays. In either case, however, the molecule from which the electron has been expelled is left with a positive charge, while the expelled electron is attracted to an uncharged molecule, to which it clings, thus giving the molecule a negative charge. The gas through which the rays are passing thus contains positively and negatively charged molecules or *ions*.

The existence of these ions can be demonstrated by sending a flash of ionizing radiation through air which is saturated with water-vapour, and then suddenly chilling the air, most conveniently by allowing it to expand rapidly. The charged ions serve as nuclei for the deposition of the excess water-vapour, and each ion is seen surrounded by a glittering drop of water. If the ionization is not too intense, the number of ions in the gas can actually be counted. C. T. R. Wilson has in this way obtained very beautiful photographs of the actual tracks of the ionizing radiations through a gas.

Since a gaseous ion is formed by the emission of an electron from a neutral atom, the charge on a gaseous ion is equal to the electronic charge, and also to the charge on a monovalent electrolytic ion. Owing to the much smaller resistance to motion offered by a gas than by a liquid, the mobility of the gaseous ions is much greater than that of electrolytic ions, the mobility of an ion in air under normal conditions being about 1·36 cm. per second in a field of 1 volt per centimetre for the positive ion, and rather more for the negative ion. The higher speed of the negative ion is due to the fact that over part of its path it is in the free electronic condition.

In many ways, however, gaseous ionization differs from electrolytic ionization. In the first place the number of gaseous ions is relatively very small. It has been calculated that with a moderately strong beam of X-rays passing through the gas an individual molecule would not become ionized on an average more than once every hundred years. Thus the ionization currents produced are usually far too weak to affect even a sensitive galvanometer. They are measured by finding the rate at which the charge increases on an electrometer or electroscope connected to one electrode of the ionization chamber.

In this way currents as small as 10^{-16} ampere can be measured. This corresponds to the transference to the electrode of about 700 ions per second. As both positive and negative ions are molecules of the same gas, there is no chemical difference between them, and the ionization current in a gas does not produce chemical decomposition.

The most important distinction between the two kinds of ionization lies in the fact that gaseous ionization is not spontaneous, the ions being formed by an external agency. As the gaseous ions are oppositely charged, they attract each other, and on colliding exchange charges, parting again as neutral molecules. This process is called *recombination*. If the ionizing agent is withdrawn, this recombination rapidly results in the removal of all ionization from the gas, which, after the lapse of a few seconds, again becomes non-conducting.

If the field applied between the electrodes of the ionization chamber is small, so that the ions take an appreciable time to reach the electrodes, many will recombine before reaching an electrode, and the current will be small. By sufficiently increasing the applied field and consequently the velocity of the ions, a stage may be reached when all the ions reach the electrodes without recombination, and the current then becomes independent of the applied electromotive force. This current is known as the *saturation current*.

Saturation is generally reached with

a field of 20 volts per centimetre. The saturation current is obviously proportional to the rate of formation of the ions in the gas, and this, in turn, is proportional to the intensity of the ionizing agent. A measurement of the saturation current produced by a given ionizing radiation is the most sensitive and accurate method of measuring the intensity of the radiation itself.

Small quantities of radium are measured, in practice, by comparing the saturation currents produced in an ionization chamber by the γ-rays they emit with that produced by the γ-radiation from a standard quantity of radium at the same distance.

A certain amount of energy must be expended to expel an electron from a neutral molecule, and thus work must be done by the ionizing agent in ionizing the gas. The energy necessary to produce an ion varies somewhat with the nature of the gas, but is of the order of $1{\cdot}7 \times 10^{-11}$ ergs in the case of hydrogen. It is generally expressed in terms of the difference of potential through which an electron must fall to attain the necessary energy. This is known as the *ionization potential* of the gas, and amounts to 11 volts for hydrogen.

It is clear that if we sufficiently increase the potential difference between the electrodes of an ionization chamber, we shall eventually reach a stage when the ions formed in the gas acquire velocities sufficiently high to enable them to form fresh ions on colliding with an uncharged molecule. This process is termed *ionization by collision*. Ionization by collision occurs most readily when the pressure of the gas is low, as the mobility of the ions is greater at low pressures. As the ions formed by collision are able to repeat the process on still other uncharged molecules, the number of ions in the gas increases enormously when this stage is reached, and eventually a spark or an electric arc is formed between the electrodes. Under these circumstances the current through the gas may reach several amperes.

Ultra-violet light, if of sufficiently high frequency, will ionize a gas directly. If the frequency is too small for this, the light may still cause the emission of negative electrons from the metal electrode if it is allowed to impinge upon it (*see* PHOTO-ELECTRIC EFFECT), the electrons forming ions by combining with neutral molecules of the gas. In this case the ions in the gas are all of the same sign, and a current will pass through the gas only when the illuminated electrode is negatively charged.

Gases may also be ionized in the presence of various chemical actions (e.g. during the slow oxidation of phosphorus) and by bubbling through solutions of various substances. The gases of flames are also intensely ionized, the ionization being increased if salt vapours are present in the flame, or if the electrodes are raised to incandescence. The ions produced by chemical means or by a flame are much larger than those produced by radiations. This is shown by their much smaller mobilities. They probably consist of aggregates of a considerable number of molecules.—BIBLIOGRAPHY: W. C. D. Whetham, *Theory of Solutions*; J. S. Townsend, *Electricity in Gases*; J. A. Crowther, *Ions, Electrons, and Ionizing Radiations*.

I'OPHON, Greek tragic poet, a son of Sophocles. He is said to have gained the second prize in a contest with Euripides and Ion in 428 B.C. Of his plays, fifty in number, only a few lines are extant.

I O U (= I owe you), an acknowledgment of debt. Its form is generally as follows:

"Place and Date.

"To A. B.,

"I O U Five pounds sterling.

"(Signed) C.D."

So worded, it is neither a promise to pay nor a receipt, and is not liable to stamp duty. In an action for payment, it is evidence of the debt.

I'OWA, one of the central United States, bounded on the north by Minnesota; east by Wisconsin and Illinois, from which it is separated by the Mississippi; south by Missouri; and west by Nebraska and South Dakota, from which it is separated by the River Missouri; area, 56,147 sq. miles. It is well watered, its streams being all affluents of the large rivers which bound it on the west and east. To the Mississippi flow the Wapsipincon, Iowa, Cedar, Skunk, and Des Moines, with a general south-easterly course. To the Missouri flow the Big and Little Sioux and other streams. The surface is undulating, nearly four-fifths being arable and included in ranches.

Climate, &c. The climate is very healthy, and winter continues from December to March; the summer heat is tempered by frequent showers. The soil is in general very good, consisting of a deep black mould, intermingled in the prairies with sand, red clay, and gravel.

Production and Industry. The eastern portion is rich in minerals. Lead is wrought to a considerable extent, and zinc, iron, and coal are found. The coal-fields cover an area of 19,000 sq. miles, and the yearly output is more than 7,000,000 tons.

Limestone, gypsum, and clay are abundant. The area occupied by forests and woodland is over 5,000,000 acres.

Iowa is a great agricultural state, producing immense quantities of Indian corn, wheat, and oats, and also stands high in regard to dairy farming. It has livestock industries; others include the manufacture of farm implements, flour-milling, pork-packing, machinery, and smelting-works.

Chief Towns. The capital is Des Moines (pop. 142,559), the principal towns being Sioux City, Dubuque, Davenport, Burlington, Council Bluffs, Cedar Rapids, Waterloo, and Ottumwa. Pop. (1930), 2,470,939. There is an Indian reserve of 5 sq. miles. Pop. (1930), 389.

Communications. The length of railways open for traffic is 9,709 miles not including 982 miles of electric lines. It possesses exceptional advantages for river trade, and the smaller streams supply abundant water-power.

Education. Education is well attended to. There is a State University (at Iowa City), besides the Drake University at Des Moines, the Upper Iowa University at Lafayette, and a flourishing State College of Agriculture.

History and Government. The settlement of Iowa began in 1833, when the first purchase of land from the Indians took place; its territorial government was instituted in 1838, and it was admitted into the Union in 1846. The state sends two Senators and nine representatives to Congress.

IOWA CITY, a city in the United States, capital of Johnson county, Iowa, on the River Iowa, at the head of the navigation. The city was founded in 1839, contains the State University, and was the state capital from 1839 to 1857. Pop. (1930), 15,340.

IPECACUANHA, *Psychotria* (*Cephælis*) *Ipecacuanha*, a small Rubiaceous plant, found wild in Brazil, and cultivated there and in the Straits Settlements. The thickened roots contain about 2½ per cent of alkaloids (emetine, cephæline, and psychotrine), and furnish a valuable drug, *Ipecacuanhæ radix*, largely used as an expectorant in bronchitis, croup, and whooping-cough.

IPHIGENIA (if-i-je-nī'a), in Greek legend and poetry, daughter of Agamemnon and Clytemnestra. To avert the wrath of Artĕmis, whom Agamemnon had enraged, and who detained at Aulis the Greek fleet that had been prepared for the Trojan War, Iphigenia was to be sacrificed on the altar; but a stag was miraculously substituted for her, and she was conveyed in a cloud to Tauris. She became priestess there to Artĕmis, and saved her brother Orestes when on the point of being sacrificed. The story of Iphigenia is the subject of two plays by Euripides, and of one by Racine and another by Goethe.

IPOMÆ'A, a large genus of plants of the nat. ord. Convolvulaceæ, consisting mostly of twining prostrate herbs, widely distributed in warm regions. The species of most importance is *I. Purga*, which yields the jalap of commerce. *See* JALAP.

IPSAM'BUL, ABUSAM'BUL, or **ABUSIM'BEL,** a village of Nubia, on the left bank of the Nile; remarkable for an enormous cliff temple begun by Pharaoh Seti I, who died in 1292 B.C., and finished by his son Rameses II. The colossal sitting statues of Rameses and his wife are most impressive. On the front of the temple is a record of the visit of the Hittite king after a peace treaty had been arranged. On one of the colossi of Rameses is a record in Greek of the visit of Psamtik II, who succeeded Necho in 593 B.C.

IPSWICH (ip'swich), a parliamentary, county, and municipal borough of England, capital of Suffolk, on the Orwell. The public buildings include a fine town hall, a post office, a custom-house, county court-house, cavalry barracks, and theatre. The industries embrace agricultural implements, machinery, artificial stone, artificial manure, silk, tanning, ropes, lime and cement, brewing, and shipbuilding. There are docks for the shipping.

Ipswich is a town of great antiquity. It was originally called Gippeswich, from the neighbouring River Gipping. King John gave it its first charter. In 1906 a cemetery dating from the fifth century was discovered at Ipswich, and various objects of antiquity unearthed. The French villages of Bazentin-le-Grand, Bazentin-le-Petit, and Fricourt were adopted by Ipswich. From 1295 to 1918 it returned two members to Parliament but now sends only one. Pop. (1931) 87,557.

IPSWICH (ip'swich), a town of Queensland, Australia, on the River Bremer, 23½ miles west of Brisbane, in a mining, manufacturing, and agricultural district. There are large railway workshops and coal-mine there. Pop (1931), 26,253.

IQUIQUE (i-kē'kā), a seaport of Chile, province of Tarapacá, formerly a fishing-village, but now a considerable town with an important trade its rise being due to the extensive deposits of nitrate of soda and bora

and the silver-mines, &c., in its neighbourhood. The town formerly belonged to Peru, but was handed over to Chile in 1883. It has suffered much from earthquakes, and also from more than one serious fire. Pop. (1932), 46,458.

IQUITOS (i-kē'tōs), a Peruvian town, department of Loreto, on the Marañon, or Upper Amazon, with an active trade, exporting much rubber. Pop. 10,000.

IRAN or **ERAN** (O.Pers. *Aryana*; Zend *Airyana*, that is, land of the Aryans), the name given by the ancient Persians to their native land, and still used by the modern Persians, though it is also employed in a wider sense to designate the whole of the country from the Indus to the Tigris, in contradistinction to Turan, the name often employed as synonymous with Turkistan.

IRANIAN LANGUAGES, a family of languages belonging to the Indo-European stock, closely allied to the Indian group, and called by some philologists Persian, from the best-known member of the family. The two oldest-known Iranian languages are the Old Persian of the cuneiform inscriptions and the Old Bactrian or Zend, the latter the language in which the *Zend-avesta* or sacred writings of the Parsees is composed.

The Middle Iranian languages are the Pehlevi, and still later the Parsee, which are preserved in the commentaries to the *Zend-avesta*. The latter approaches pretty closely to the modern Persian. The most important of the New Iranian languages is the modern Persian, in which has been produced a very rich and celebrated literature. The Afghan or Pushtu, and the dialects of the Kurds, form separate branches of the Iranian family.

'IRAQ (Mesopotamia), a kingdom of South-West Asia, composed of the three former Turkish vilayets of Baghdad, Basra, and Mosul, which were conquered during the European War. It was recognized as an independent state to be placed under a mandatory power, and the mandate was granted to Britain by the League of Nations.

In 1921 the Emir Faisal, son of the King of the Hejaz, was elected king, and by a treaty signed in 1923 Great Britain agreed that the mandate should lapse if and when 'Iraq became a member of the League of Nations, and, in any case, not later than 1928. In 1927, however, a treaty was signed by which Britain recognized 'Iraq as an independent sovereign state, and 'Iraq agreed to be guided by the advice of the British High Commissioner. 'Iraq entered the League of Nations in 1932.

A Constituent Assembly at Baghdad in 1924 passed organic and electoral laws by which the country is under a constitutional and hereditary monarchy, a Senate nominated by the king, and an elective Assembly. 'Iraq is bounded by Kurdistan, Persia, the Persian Gulf (coast-line about

Old Houses in Fore Street, Ipswich

15 miles), and Arabia, but the actual boundary lines have in many places not been demarcated.

In 1924 the Turks began to press claims to the entire vilayet of Mosul, in spite of the fact that the League of Nations Council, sitting at Brussels in the same year, had fixed the northern boundary of Mosul (the 'Brussels Line') as the 'Iraq frontier. The British Government attempted to treat with Turkey, but the attempt failed, and the matter was referred to the League of Nations, which appointed a Commission to investigate.

After receiving the reports of the Commission, the League of Nations Council issued its decision in Dec., 1925; the 'Brussels Line' was adhered to as the 'Iraq frontier, provided that Great Britain would accept responsibility for 'Iraq for 25 years, or less if 'Iraq should, during that period, become a member of the League of Nations.

The Turks eventually signed the Mosul Treaty (incorporating the League decision) in 1926. Mosul is of importance to Britain because of the valuable oil-wells. The following table gives the area and population of 'Iraq:

Vilayet.	Area in Sq. Miles.	Population.
Baghdad ..	113,867	1,360,304
Basra ..	27,070	785,600
Mosul ..	36,211	703,378
'Iraq ..	177,148	2,849,282

Of the total population 1,146,685 are Sunni Mahommedans, 1,494,015 Shi'ah Mahommedans, 87,488 are Jews, and 78,792 Christians. The country is a vast alluvial plain stretching north from the Persian Gulf to the hills of Mosul. The climate is subtropical, the rainfall scanty, and the country is in general unhealthy and malarial.

The chief rivers are the Euphrates, the Tigris, and the Shatt el 'Arab, which is the name given to the watercourse formed by the union of these two streams and which flows to the Persian Gulf. The soil is extremely fertile; the valley of Mesopotamia between the Tigris and the Euphrates is one of the richest in the world, and the two great rivers are capable of irrigating several million acres. There are several canal systems, and about 1,000,000 acres are irrigated by pumps. The Hindiyah Barrage and the Dagharrah Barrage are among the most important irrigation works.

Production and Industry. Wheat, barley, rice, and millet are the chief crops, tobacco and cotton are also grown, and dates, a staple food, abound. Sheep-rearing is important. Manufactures are few and are purely for the local market.

Oil is the chief product, there being petroleum wells at Qaiyara, near Mosul, and at Mandali, near Baghdad (worked by the Anglo-Persian Oil Company). There are also asphalt deposits at Hit on the Euphrates. There are great British oil refineries in the south-east.

Communications and Towns. Baghdad is the capital, Mosul and Karbala are also important places, and Basra, 70 miles up the Shatt el 'Arab, is the chief port (the channel from the Persian Gulf is being considerably deepened to allow passage for large ships). There were 752·7 miles of railway track in 1932 (*see* BAGHDAD RAILWAY). There is an air-mail service between Cairo and Baghdad, and a regular motor service from Damascus.

Education and Defence. There are numerous secondary schools and colleges. The first part of Al ul Bait University was opened in 1926. The British Imperial forces in 'Iraq are under the Air Ministry, but there is also a Levy Force under British officers.

Commerce and Currency. In 1932 the value of exports was £3,466,783, and of imports £4,798,363. In 1932 the dinar became the unit of currency. It is equal in value to one pound sterling.—BIBLIOGRAPHY: G. L. Bell, *Review of the Civil Administration of 'Iraq*; L. P. Dana, *Arab-Asia: a Geography*; T. Lyell, *The Ins and Outs of Mesopotamia.*

'IRAQ AJ'EMI, an interior province of Persia, separated from the Caspian Sea by Ghilan and Mazanderan; area, about 138,000 sq. miles, a large part of which in the east is occupied by salt deserts, the rest being largely mountainous, with some fine valleys and rich plains. The chief towns are the capital, Teheran, and Isfahan. Pop. about 2,500,000.

'IRAQ AR'ABI, a state of Mesopotamia, lying between the Rivers Tigris and Euphrates, corresponding nearly to the ancient Babylonia. The district was mandatory to Great Britain, who proclaimed Emir Faisal as King. *See* HEJAZ. Pop. about 2,000,000.

IRAWADI. *See* IRRAWADDY.

IR'BIT, a town in Russia in the government of Perm, on the frontiers of Siberia, at the confluence of the Irbit and the Niza. It is noted for a great annual fair, dating from the seventeenth century, and held in the month of February. Pop. 20,000.

IRELAND, John, English composer, born at Bowden, Cheshire, 13th Aug-

ust, 1879. Educated at Leeds Grammar School and at the Royal College of Music. He began with concerted chamber music and songs, and later composed two notable violin sonatas which brought him fame. He has also written a number of songs, one of his most popular being the setting of Masefield's *Sea Fever*.

IRELAND, William Henry, son of a London bookseller and publisher (author of various illustrated works), born in 1777, died 1835. He imposed spurious Shakespearean MSS. upon his father, who was a Shakespeare enthusiast, and also upon other men of letters, and produced two 'Shakespearean' plays, *Vortigern* and *Henry II*, the former of which was purchased by Sheridan and acted at Drury Lane, but was a complete failure.

The criticisms of Malone led to the exposure of the fraud, which was acknowledged by Ireland in 1796. Several novels and poems proceeded from his pen, besides his *Confessions* (1805), containing an account of his forgeries.—Cf. James Payn, *The Talk of the Town*.

IRELAND (Old Fr., *Heriu*, Modern Ir., *Erin*; in Lat., *Hibernia*), the more western and smaller of the two principal islands of which the British Isles are composed, is separated from Great Britain on the east by the North Channel, the Irish Sea, St. George's Channel, and surrounded on all other sides by the North Atlantic Ocean.

Measured diagonally, the greatest length, from Mizen Head in the south-west to Fair Head in the north-east, is 300 miles; and the greatest breadth, from Carnsore Point in the south-east to Benwee Head in the north-west, is 212 miles; the central breadth, nearly between the bays of Dublin and Galway, is 110 miles.

Politically Ireland is divided into Northern Ireland and the Irish Free State (*see* separate articles). The civil divisions are the four provinces of Leinster, Ulster, Munster, and Connaught, which are subdivided into thirty-two counties and six county boroughs. These, with their areas and populations, are as in the table.

Surface. The coast, forming a line of nearly 3,000 miles, is, in general, bold and rugged, and is diversified by numerous indentations, some of which run far into the land and form excellent natural harbours. There are a considerable number of islands, chiefly on the west coast, the largest being Achill. The mountains, generally speaking, rise in isolated masses at a short distance from the coast, the interior having the form of a vast plain, in which are extensive tracts of bog. The Macgillicuddy's Reeks, in the south-west, are the highest, the culminating summit being Carrantual, 3,414 feet. The mountains of Wicklow, in the south-east, reach the height of over 3,000 feet (Lugnaquilla is 3,039 feet).

Rivers are not only numerous but are very equally distributed over the surface. The Shannon, the largest river, is navigable to its source in Lough Allen, forming a waterway of 240 miles. The other rivers of most importance are the Bandon, Lee, Blackwater, Suir, and Barrow, which enter the sea on the south, the last two by the union of their streams forming the broad estuary of Waterford Harbour; the Slaney, in the south-east angle, which expands into Wexford Haven; the Liffey and the Boyne, entering the sea on the east, the former having the capital at its mouth, the latter being the largest river which discharges itself into the Irish Sea on the east

Treaty Stone at Limerick, Ireland

coast; and the Bann and the Foyle, which have their mouths at no great distance from each other on the north coast.

Ireland possesses a vast number of lakes (or loughs). Lough Neagh, in the north-east, is a quadrangular expanse 17 miles long by 10 miles broad, and is the largest lake of the United Kingdom. The other more important lakes are Lough Erne, also in the north; Lough Corrib, in the west, and connected with it by a subterranean channel Lough Mask; Lough Conn, also in the west; and Loughs Allen, Ree, and Derg—the first the commencement, and the other two wide expansions of the Shannon. Besides these there are many others, among which the lakes of Killarney, in the south-west, are pre-eminent for beauty, and attract numerous visitors.

Areas are exclusive of water. Population figures are those of the last (1926) census. The population has decreased from 8,196,597 in 1841. This is due to the famine in 1846–1847 and to the fact that over

Provinces and Counties.	Area in Acres.	Population (1926).
IRISH FREE STATE.	17,019,155	2,972,802
Connaught—	4,228,211	552,757
Galway ..	1,467,850	169,311
Leitrim ..	376,510	55,888
Mayo ..	1,333,356	172,661
Roscommon	608,290	83,504
Sligo ..	442,205	71,393
Leinster—	4,847,731	1,148,911
Carlow ..	221,485	34,504
Dublin ..	218,873	189,248
Dublin (C.B.)	7,911	316,471
Kildare ..	418,645	58,035
Kilkenny	509,458	70,965
Leix (Queen's)	424,838	51,549
Longford	257,770	39,831
Louth ..	202,181	62,687
Meath ..	577,735	62,909
Offaly (King's)	493,263	52,521
Westmeath	434,665	56,796
Wexford ..	580,950	95,812
Wicklow ..	499,957	57,583
Munster—	5,963,557	971,033
Clare ..	788,337	95,028
Cork ..	1,841,035	287,254
Cork (C.B.)	2,681	78,468
Kerry ..	1,161,752	150,865
Limerick ..	661,574	100,244
Limerick (C.B.)	2,385	39,690
Tipperary	1,051,304	140,946
Waterford	453,051	51,892
Waterford (C.B.)	1,438	26,646
Ulster (Part of)—	1,979,656	300,101
Cavan ..	467,025	82,447
Monaghan	318,990	65,143
Tirconaill (Donegal)	1,193,641	152,511
NORTHERN IRELAND	3,351,970	1,256,322
Ulster (Part of)—	3,351,970	1,256,322
Antrim ..	702,654	191,618
Armagh ..	312,772	110,083
Belfast (C.B.)	14,937	415,007
Down ..	608,862	209,179
Fermanagh	417,912	57,985
London-derry	512,691	94,511
London-derry (C.B.)	2,579	45,164
Tyrone ..	779,563	132,775
Ulster (Total)	5,331,626	1,556,423
IRELAND (Total)	20,371,125	4,229,124

4,000,000 emigrants have left the country since 1851.

Geology and Minerals. The mountains are formed of vast masses of primary and metamorphic rocks, while the secondary formations spread over the interior. Basaltic rocks are almost entirely confined to the north-east, where they often form colonnades, of which the Giant's Causeway is a celebrated specimen.

Granite has its largest development in the south-east, where it forms the great mass of the mountains of Wicklow. It is more sparingly developed in the west and north-west (Donegal), as well as in the north-east. The lower rocks of the Silurian system form no inconsiderable portion of the whole island, covering large portions of the north-north-east and south-west as well as parts of the west.

The Old Red Sandstone has its largest continuous development in the county of Cork, but rises to the surface at numerous isolated spots. The rocks next in the series belong to the Carboniferous system; at the bottom of which lies the Mountain Limestone, the most largely developed of all the rocks of Ireland, occupying almost the whole of the interior.

In some cases, particularly in the south-west, the coal-measures occupy considerable areas, but the quality of the coal is generally very inferior, and it is worked only to a very small extent, the yearly output being only about 100,000 tons. The strata higher in the geological series than the coal are very partially developed. Of other minerals than coal Ireland yields small quantities of iron ore, lead ore, slate, alum, and salt.

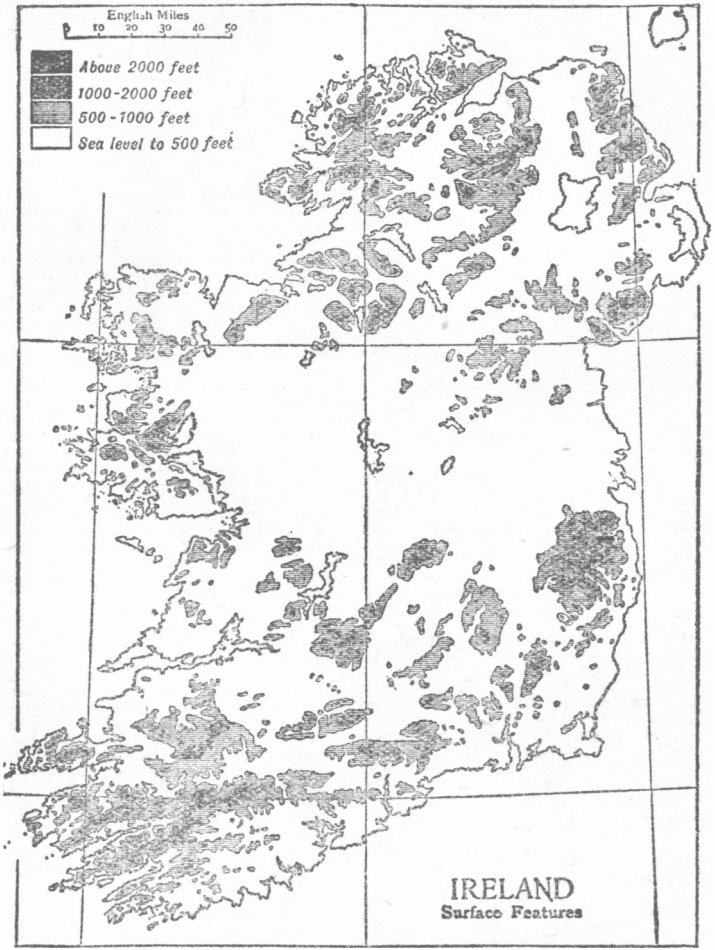
Climate. The climate is on the whole moister, milder, and more equable than that of the greater part of Britain. It is highly favourable to vegetation, and allows plants to winter in the open air that can do so in very few places in Britain; some species of plants also being peculiar to Ireland alone of the British Isles, as, for instance, the strawberry tree or arbutus, found in the south-west.

Agriculture. As regards agriculture Ireland has great advantages, for though there is a great extent of moorland, there is also a vast area of arable surface, covered with a deep friable loam of remarkable richness. Notwithstanding, agriculture on the whole is in a backward state, a result largely due to the smallness of the holdings, and to the evils of overcropping. However, a steady diminution has taken place in the number of very small holdings in recent years, especially since 1909. The rearing of live stock and dairy-farming are largely carried on, and the latter has become

more prosperous since the farmers have been working on the co-operative principle.

By far the largest grain crop is oats; the chief green crop is potatoes, which grown, only about as much as in Wales; but oats cover a larger area than in Scotland. Another staple crop (in the north) is flax.

Many improvements were intro-



cover an area about one and a half times as large as in England. Potatoes had become the main food of the people by the end of the seventeenth century, and a potato famine occurred as early as 1739. Little wheat is

duced in the Land Act of 1881, the main provisions of which are known under the terms 'fair rent,' 'fixity of tenure,' and 'free sale.' By the first of these, any tenant objecting to his rent, or the rent the landlord wishes

to exact, may have a 'fair rent' fixed for him by a court, this rent to remain unaltered for fifteen years.

By 'fixity of tenure' the law recognized that the tenant has a certain right in his holding in virtue of which he is not to be arbitrarily removed without compensation, and which enables him on leaving his farm to obtain the best price he can by the 'free sale' of this right of tenancy. At the end of fifteen years the landlord may resume possession of the holding on paying the tenant compensation for improvements and also the value of his tenant-right.

This and other Acts being judged insufficient to serve as a settlement of the land question, an Act was passed in 1903 to enable tenants to purchase their holdings and to encourage owners to sell, the necessary funds, to the extent of £112,000,000, to be advanced on State guarantee. Many holdings were thus purchased by the tenants. Under the Land Act of 1909 the Congested Districts Board was reconstituted and the area of its work extended. Compulsory powers of purchase were also given to the Board.

History. The beginning of the history of Ireland is enveloped in fable. As in Western Europe generally, the earliest inhabitants are believed to have been of Iberian race, and therefore akin to the modern Basques. They were followed by the Celts, different tribes of whom probably arrived at different times, giving rise to such names as Firbolgs, Milesians, &c. Among these the Scots were the latest, and subsequently got the upper hand, so that their name became generally applied to all the inhabitants.

There is no evidence that the Irish had the use of letters before the middle of the fifth century, when Christianity and Christian literature were introduced by St. Patrick. Subsequently Ireland became the seat of Western learning; and its monasteries were the schools whence missionaries proceeded throughout continental Europe.

Its internal condition, however, was far from satisfactory. Divided among a number of hostile kings or chiefs, it had been long torn by internal wars, and for nearly two centuries ravaged by the Danes, numbers of whom settled in the country, when, in the beginning of the eleventh century, Brian Boroimhé united the greater part of the island under his sceptre, restored tranquillity, and subdued the northern invaders.

After the death of Brian at the close of the battle of Clontarf, 1014, gained against the Danes and their Irish allies, the island relapsed into its former state of division and anarchy. In this state of matters Henry II of England obtained a Papal Bull giving him the right to subdue it, and the way was paved to this when Dermot, Prince of Leinster, who had been driven from the country, was reinstated by the aid of Richard de Clare (Strongbow) and other Norman nobles.

In 1172 Henry entered Ireland himself, and partly through the favour of the clergy and his affability, the great princes did homage to him and acknowledged his supremacy. Many Norman barons and their followers now settled in the country, but the English power was far from being established over it. For long only a part was recognized as English territory (generally known as 'the Pale'), and this was governed by various nobles, subject to a Viceroy. The nobles quarrelled among themselves, and were very often at open feud.

In 1315 Edward Bruce, brother of the Scottish king, landed at the head of a large force, and was crowned king, but was defeated by the English in 1317 near Dundalk. The English power was greatly reduced by this expedition, however, and a number of the barons renounced their allegiance to England, and adopted the Irish language, laws, manners, and customs. This led to the passing of the Statute of Kilkenny (1367), forbidding, under severe penalties, intermarriages between English and Irish, the assumption of Irish names by persons of English blood, and the use of the Irish language or the native (Brehon) law. But the English rule became so weak that the Viceroy found it necessary to protect the Pale by payments of money to the Irish chiefs, and this state of matters long continued.

In the reign of Henry VII (1495) was passed Poynings' Act (so called from Sir Edward Poynings, Lord-Deputy of Ireland), which provided that all former laws passed in England should be in force in Ireland, and that no Irish Parliament, that is the Parliament of the English settlers, should be held without previously stating the reasons why it was to be summoned, and the laws it was intended to enact.

At the beginning of the sixteenth century the greater part of the island still remained unconquered by the English. The native Irish lived according to their old customs under their own chiefs, and in manners and mode of life were still totally uncivilized.

Henry VIII assumed (by Act of the Irish Parliament) the title of King of Ireland, instead of *Lord*, which he had before borne as a vassal of the Pope, and the Irish chiefs generally acknowledged his authority; but the change of religion was bitterly opposed, and Mary was easily able to undo all that had been done in this direction by her two predecessors.

Elizabeth imposed a Protestant clergy upon the people, and her reign was marked by a series of risings, which terminated in the reduction of the whole island. Great stretches were taken from the Irish chiefs, and distributed among English noblemen and others, who were to settle their new estates with English farmers. Little was done in this way, however, compared with the great plantation of the North by James I, under whom 800,000 acres of land in Ulster were declared forfeited, a large part of this being entirely withdrawn from the Irish, and divided among Scottish or English settlers.

In 1641 there began an attempt to shake off the English yoke, in which great numbers of the settlers were massacred by the native Irish. In 1649 Cromwell was appointed Lieutenant, and energetically, but cruelly, reduced the whole country within nine months.

The next struggle was that which followed the Revolution, when James II landed in 1689, and hoped to regain his crown by French and Irish aid. He failed to reduce Londonderry, which held out, enduring the extremity of famine, till it was relieved by some ships from England.

In the following year (1690) William III arrived, and on the 1st of July gained a decisive victory over the forces of James on the Boyne, near Drogheda. In 1691 another victory was gained over the Irish at Aughrim in Galway, and in October Limerick, the last place that held out for James, capitulated, a treaty being concluded at the same time, by which the Catholic Irish were to be allowed the free exercise of their religion.

The Treaty of Limerick was ill kept by the English. By a decree of Parliament upwards of 1,000,000 acres were confiscated and divided among Protestants. Cruel penal laws were passed against those who adhered to the Catholic religion. The Catholic ecclesiastical dignitaries were banished; the subordinate priests were not allowed to leave their counties; no Catholic could hold a public office, acquire landed property, or enter into a marriage with a Protestant.

Although these laws were not always rigorously carried out, yet they excited great bitterness of feeling, and produced frequent revolutionary associations (*Whiteboys* and others), which mark the history of Ireland. In 1778 the penal laws against the Catholics, though not repealed, were made much more lenient. Catholics were henceforth permitted to acquire landed property, to erect schools, and to observe their own religion under fewer restrictions. In 1782 Poynings' Act was repealed, and freedom of legislation allowed to the Irish, though Catholics were still excluded from Parliament, and did not even have the franchise till 1793.

The French Revolution had a great effect on the minds of the Irish people, and it was partly through this influence that the Society of United Irishmen was formed, and that rebellion broke out in 1798. Great atrocities were perpetrated, but the rising was speedily crushed. A body of French soldiers, 1,500 strong, landed in Killala Bay, but were compelled to surrender.

The British Government now resolved to unite the Irish and British Parliaments, and an Act providing for the legislative union of the two countries passed the Irish Parliament in May, 1800, and the British Parliament in July of the same year, in virtue of which the union was effected on the 1st of Jan., 1801. But although the measure bound the destinies of the two countries still more closely, yet it was far from putting an end to the troubles which had so long divided them. In 1829, mainly through the efforts of O'Connell, the Catholic Emancipation Act was passed, under which Catholics could take a seat in Parliament, and were admitted to most public offices. (*See* CATHOLIC EMANCIPATION.)

The Irish National party now tried to repeal the Union, for which purpose O'Connell founded the Repeal Association. This movement collapsed in 1843, and afterwards the potato famine in 1845, and again in 1846, cast all other interests into the background. To mitigate this calamity Parliament granted enormous sums of money; yet thousands died from starvation, and hundreds of thousands emigrated to America. Agrarian outrages and other acts of violence distracted the land.

Meanwhile O'Connell died, and his party was replaced by one still more revolutionary, called the Young Ireland party. In these circumstances the French Revolution in 1848 had a great effect upon Ireland. The leaders of the Young Ireland party, Smith O'Brien, Mitchel, Duffy, Meagher, and others, entered into relations with the Provisional Government at Paris, and the people began openly to exercise themselves in the use of arms. But the 'rebellion' turned out a failure. After the famine and great emigration a general improvement became visible among the inhabitants. Agriculture revived, and the manufacturing industries began to compete with those of England.

The year 1865 witnessed a new movement designed to separate Britain and

Ireland. This originated in the United States, and its members called themselves *Fenians* (q.v.). It soon spread to Ireland; but before the Fenians could take any overt action in that island the British Government (1865–6) entered upon a policy of pacification; the Irish Church was disestablished by the Act of 1869, an Act to improve the tenure of land being passed in 1870.

In 1871 an agitation for what was called Home Rule, q.v., was set on foot. Its chief supporters, designated 'Nationalists,' professed not to desire the severance of Ireland from Britain; what they mainly wanted was to have an Irish Parliament for matters exclusively Irish. In 1880 Ireland became the scene of an agitation carried on mainly by a body known as the Land League. Its activities led to the passing of two special Acts, a 'Coercion' Act and a Peace Preservation Act. Still further to redress Irish grievances a Land Act was also passed in 1881, the chief provisions of which have already been mentioned. The Land League was suppressed, but a body called the National League was soon organized in its place.

In 1885, eighty-six Nationalist members (under the leadership of Parnell) were returned to Parliament, and their pressure on the Government led to Gladstone's scheme in 1886 by which Ireland was to receive a Parliament of her own and the Irish members to be withdrawn from the Imperial Parliament. This and the accompanying scheme for the buying out of Irish landlords were rejected by Parliament and the majority of the constituencies, thus bringing a Conservative Government under Lord Salisbury into power. (*See* BRITAIN.) A permanent Act for the repression of crime was passed in 1887, and an Act (Lord Ashbourne's) for the benefit of Irish tenants. A Home Rule Bill passed the Commons but not the Lords in 1893. The Local Government Act of 1898 established local councils similar to those in Great Britain. The Land Purchase Act of 1903 was intended to put an end to dual ownership, by enabling tenants to buy their farms.

In 1912 Mr. Asquith brought in another Home Rule Bill, but Protestant Ulster protested and declared that this province must be excluded from the operation of the Act. The result was the Ulster Covenant (*see* COVENANT), the forming of the Ulster volunteers under Sir Edward Carson, and the organization of the National volunteers in the south. Thus matters stood in 1914, when the prospect of passing the Home Rule Bill was threatened by the determined attitude of both sides, Nationalist Catholic Ireland and Protestant Ulster. A conference, called by King George at Buckingham Palace for the purpose of an amicable adjustment, failed in its efforts, and feeling was running high. Nevertheless the Asquith Bill was passed through Parliament with the proviso that it should not come into operation for a year or to a date to be fixed by order in council; the Ulster faction being promised an Amending Bill when the War was over.

This was the position when the European War broke out, and on the 4th of August John Redmond, the leader of the Irish Nationalists, declared that Ireland would support England and the Allies in the great ensuing struggle. For two years Ireland remained faithful to the pledge; Irish soldiers joined the British army and fought bravely on the battlefields of Flanders and France. The old feud between Ireland and England seemed to have been forgotten.

The truce, however, was not of long duration. In 1916 the Easter risings at Dublin marked a turning-point in the history of Ireland. An attempt was made to land arms and ammunition in Ireland by a vessel disguised as a neutral merchant ship, but in reality a German auxiliary. On 24th of April serious disturbances broke out in Dublin, and the rebels made an attack on Dublin Castle. The situation was very serious, and martial law was proclaimed over the whole of Ireland. The Sinn Feiners, on the other hand, called upon the people of Ireland to rally to the support of the Provisional Government of the Irish Republic. Several 'rebel' leaders were sentenced to death and others to penal servitude.

Early in 1918, after the March offensive, the decision of the War Cabinet to impose conscription upon Ireland produced a serious situation. The Government promised at the same time to put Home Rule into effect, but the difficulties were great. Whilst the men of Ulster still denied the right of any one to force them to accept Home Rule, the Nationalist party, with the support of nearly every other section of opinion in the south, organized a movement against obligatory military service.

In May trouble again broke out in Ireland. Lord French had succeeded Lord Wimborne as Lord-Lieutenant, and under his regime conditions in the country soon resembled those of a military occupation. The Lord-Lieutenant posted a Proclamation declaring that strict measures would be taken against the Sein Fein and Republican movements, which had gained fresh impetus from the events of Easter week, and on the same day some 150 Sinn Feiners were arrested under the Defence of the Realm Act. The Sinn

Fein movement, however, continued to make progress, and the Nationalist party, the leadership of which passed from John Redmond to John Dillon, in 1917, was practically superseded. The British Government, after having declared that it would apply conscription to Ireland withdrew the threat, and renewed efforts were made to settle the problem of Home Rule. Various solutions were put forward and discussed in Parliament, one of these being the idea of including Ireland as a confederate state in the great Imperial Federation to be created after the war. The Lloyd George cabinet in 1917 proposed an Irish convention of all parties to produce a scheme.

The attitude of Sinn Fein, however, remained irreconcilable, and in the general election of Dec., 1918, the Sinn Feiners carried seventy-three seats. The elected members were pledged to abstain from taking their seats in Westminster. They remained in Ireland, and in Jan., 1919, held a meeting at Dublin, when they constituted themselves as *Dail Eireann*, the Irish Parliament, issued a declaration of independence and of the establishment of an Irish Republic, with De Valera (born in America of an Irish mother) as President, and Arthur Griffith (of Welsh extraction, born in Dublin) as Vice-President, and finally demanded the evacuation of Ireland by the 'foreign garrison.' The British Government at once took measures to repress the movement, and the civil war flared up again more fiercely than ever. The number of British troops in Ireland was increased and the result was a series of riots, murders, reprisals, and counter-reprisals.

Numerous attempts to bring about a settlement and truce failed. In July, 1921, however, after the Home Rule Act came into force for the six northern counties, the Sinn Fein leaders accepted the invitation of the Government to come to London for the purpose of discussing the basis of a compromise and a final settlement of the Irish question. The conference between the British Government and the Sinn Fein leaders began on 11th Oct., 1921, and, after the negotiations had almost fallen through, an agreement was come to at 3 a.m. on Tuesday, 6th Dec., 1921. By this agreement Ireland was to be known as the 'Irish Free State,' and was to be given the status of a self-governing dominion. Northern Ireland had the option of remaining out of the Irish Free State. A week later the British Parliament approved the treaty, with only 58 dissentients in the Commons and 47 in the Lords.

After much bitter dissension An Dail Eireann ratified the treaty on Saturday, 7th Jan., 1922, by 64 votes to 57. The Sinn Fein party was split in two, one section, under Mr. Griffith, who was elected President of Dail Eireann on 10th Jan., 1922, being in favour of the terms of the treaty, while the other section, under Mr. De Valera, would be content with nothing less than an Irish Republic and total separation from Britain. On 21st Jan. a meeting took place between Sir James Craig (later Lord Craigavon) the Premier of Northern Ireland, and Mr. Michael Collins, the head of the Provisional Government of Southern Ireland, to consider boundary and other questions.

After the treaty of 1921 the republicans, headed by De Valera, continued their agitation against the Treaty. De Valera was captured and again imprisoned for a year in 1923. On his release he became the leader of the Republican party. He modified his own attitude to the extent of proposing that the Republicans should enter the Dail (and the Northern Parliament) if the oath of allegiance were abolished. This policy produced a division in the Republican organisation; and for some years the Cosgrave party controlled the Government. De Valera, however, displaced Cosgrave as President, or head of the Government, in 1932 when his party won the General Election. Re-elected in 1933 with a stronger following he proceeded to carry out his policy of separating the Irish Free State from Great Britain, claiming that his proposal to abolish the oath and his withholding the payment of the land annuities claimed by the British Government had been approved by the electors. The Oath was abolished. But the dispute with the British Government on the annuities question has remained unsettled. The British Government imposed import duties on Irish Free State cattle, dairy produce, &c., avowed by as a means of trying to recover the payments claimed; but the Irish Free State retaliated with even heavier duties on British exports, and the trade of both countries has suffered in consequence. The Irish Free State Government has made this state of affairs the ground for a vigorous effort to develop domestic industries and to find continental markets for Irish products. *See* IRISH FREE STATE; NORTHERN IRELAND.—BIBLIOGRAPHY: E. A. D'Alton, *History of Ireland from the Earliest Times to the Present Day*; J. F. Boyle, *The Irish Rebellion*; J. W. Good. *Ulster and Ireland*; R. M. Henry, *The Evolution of Sinn Fein*; P. W. Joyce, *Social History of Ancient Ireland*; M. Macdonagh, *The Home Rule Movement*; M. J. F. M'Carthy, *The Irish Revolution*; E. MacNeill,

Phases of Irish History; J. Mitchel, *The History of Ireland*; Murphy, *Ireland: Industrial, Political, Social*; R. H. Murray, *Revolutionary Ireland and its Settlement*; G. O'Brien, *The Economic History of Ireland in the 18th Century*; Sir Horace Plunkett, *Ireland in the New Century*; P. Wilson, *The Beginnings of Modern Ireland*.

Language and Literature. The Irish language belongs to the Gaelic or Gaedhelic branch of the Celtic stem of languages, being closely akin to the Gaelic of Scotland and the Manx, and more remotely allied to the British dialects (Welsh, Cornish, and Armoric). The modern dialects or varieties of Irish, which differ very much from the ancient, are spoken by the rural classes in Connaught and Munster, and parts of Ulster. In 1881 there were 64,000 people who spoke Irish only, and over 885,000 who could speak it along with English; in 1901 the numbers were 20,953 and 620,189. In 1893 the Gaelic League was founded, and has been steadily working to revive the Irish language. Gaelic is a comparatively modern form of Irish, which, both linguistically and from the extent and antiquity of its literature, is far more important than Gaelic.

Irish literature is rather varied and extensive, including history, legendary and actual, in prose and verse, annals, genealogies and pedigrees, mythological and imaginative tales, lyric poetry, satire, lives of saints, treatises on law, science, and grammar. Some of these may be as old as the fifth century of our era. One of the earliest historic pieces is a metrical *Life of St. Patrick*. Among the most important of the heroic tales is the *Táin Bó Cualnge* (Cattle Driving of Cualnge), the centre of a series of epic tales. A certain number of poems and tales, forming a cycle of their own, may be called Ossianic; most of them are comparatively modern. The glosses written to Latin works by Irish ecclesiastics, in the monasteries on the Continent founded during the seventh and eighth centuries, are among the oldest specimens of the language.

Many bardic remains belong to the period of the English conquest, but after that date Irish poetry appears to have declined. Many bards, however, who were still maintained by the native chiefs, helped by their songs to keep up a national feeling hostile to the English domination. The native authorities for Irish history may go back to St. Patrick at the very earliest. The oldest list of kings dates from the middle of the eleventh century. The oldest and by far the ablest annalist, whose works have been at least partially preserved, is Tighernach O'Brian, who belonged to the royal family of the O'Connors of Connaught. He died in 1088. The other chief annals are the *Ulster Annals*, the *Annals of Innisfail*, and the *Annals of the Four Masters* (from its four different compilers).

The most important Irish manuscripts are contained in the library of Trinity College, and in that of the Royal Irish Academy, Dublin, in the Bodleian Library, and the British Museum. In recent times a movement was set on foot to restore the Irish language to general use and to revive Irish literature. Two societies have been very active in this revival: the Society for the Preservation of the Irish Language, and the Gaelic League. Gaelic has now become the official language of the Irish Free State.

In modern times there are many distinguished Irishmen who write in English. W. B. Yeats is the typical poet of the Celtic revival. Other poets are Lionel Johnson, George Russell ('A. E.'), Padraic Colum, James Stephens, Katharine Tynan. Gerard Hopkins is an Irish poet who belongs to no particular school. His poetry is individualistic.

In 1904 the Abbey Theatre, financed by Miss Horniman, was opened in Dublin, and there followed a fruitful period in the history of the Irish drama. Lady Gregory, the Irish dramatist, was director in association with W. B. Yeats.

In the plays of J. M. Synge Irish mysticism is tempered with a humorous observation of Irish life. Among younger writers of Irish drama the name of Sean O'Casey is prominent. His plays include *Juno and the Paycock* and *The Plough and the Stars*. Other dramatists are Lennox Robinson, Lord Dunsany and St. John Ervine.—BIBLIOGRAPHY: D. Hyde, *A Literary History of Ireland*; E. A. Boyd, *Ireland's Literary Renaissance*; *The Contemporary Drama of Ireland*; M. Maclean, *Literature of the Celts*; Justin M'Carthy (editor), *Irish Literature*.

IRENÆ'US, SAINT, Bishop of Lyons, a pupil of Polycarp, was born between A.D. 120 and 140, and was probably a native of Smyrna. He is generally supposed to have suffered martyrdom at Lyons, in the persecution under Septimius Severus in 202. He actively opposed the Gnostics. Only some fragments remain of his *Libri V adversus Haereses*, written in Greek. There is, however, a very ancient Latin version.

IRENE (I-rē'nē), Empress of Constantinople, was born at Athens about A.D. 752, and in 769 married Leo IV, after whose death she (780) became regent during the minority of her son Constantine VI. During the life of her

husband she had been banished from the imperial palace for her devotion to the worship of images; but in A.D. 788 a council of bishops held at Nice under her auspices restored image-worship in the Eastern Church. When Constantine had grown up he took up the reins of government himself, and reigned for seven years, when his mother had him arrested and his eyes put out, and he was at last murdered. Irene was the first woman to reign over the Eastern Empire. She had ordered many nobles into banishment to secure her power more firmly, but Nicephorus, her treasurer, gained the imperial throne through their influence, and exiled her in 802 to the Isle of Lesbos, where she died in 803.

IRETON, Henry, a Parliamentary general, was born in Nottinghamshire in 1611, died in 1651. Descended from a good family, he was brought up to the law; but when the civil contests commenced he joined the Parliamentary army, and by the interest of Cromwell, whose daughter Bridget he married in 1646, he became commissary-general. He commanded the left wing at Naseby, which was defeated by the furious onset of Rupert, and himself made prisoner, but some hours later he recovered his liberty.

He was an implacable enemy of the king, had a principal hand in framing the ordinance for his trial, and sat himself as one of the judges. Ireton accompanied Cromwell to Ireland in 1649, and was left by him as Lord-Deputy. He reduced the natives to obedience with great vigour, but cruelly. He died of the plague before the walls of Limerick, and was buried in Westminster Abbey (1652). After the Restoration, however, his remains were disinterred, hanged, and burned at Tyburn.

IRIARTE'A, a genus of South American palms, tall-growing trees, of which one species, *I. exorrhiza*, the pashuiba or paxuiba palm, yields a hard kind of wood used for building, and exported for umbrella handles, &c.

IRIDA'CEÆ, a natural order of endogenous plants, mostly herbaceous, and with equitant leaves (that is, leaves overlapping entirely in a parallel manner), three stamens with extrorse anthers, and an inferior ovary; natives chiefly of the middle parts of Europe and North America and the Cape Colony. They have beautiful flowers, and include the iris, gladiolus, crocus, ixia, &c.

IRIDÆ'A, a genus of Red Algæ, family Gigartinaceæ. *I. edulis* has a coarse obovate dark-red thallus, and is eaten like dulse.

IRID'IUM (Gr. *iris*, rainbow) is a metal belonging to the platinum group; symbol, Ir; atomic weight, 193·1. Iridium is found in the form of grains, which consist essentially of an alloy of platinum and iridium, called platin-iridium. Small grains of an alloy with osmium are also found, and known as osmiridium.

Iridium is a white, lustrous, steel-like metal slightly heavier than platinum, its density being 22·4. It is hard and brittle when cold, but is rendered somewhat malleable at a bright red heat. It is fusible only at temperatures of the oxy-hydrogen blow-pipe

Henry Ireton

flame. It is not acted upon by any acid, and differs from platinum in being insoluble in aqua regia. When alloyed with much platinum, or when in a finely-divided state, it dissolves in aqua regia. Iridium alloys with most metals, increasing their hardness, but it cannot be alloyed with gold. With platinum it forms alloys which are harder and stronger than pure platinum, and are much used in industry.

IRIDOS'MINE, or **IRIDOSMIUM,** a native compound of iridium and osmium, in which the iridium is less or more replaced by platinum, rhodium, and ruthenium. It is used for pointing gold pens, being nearly as hard as quartz, and iridium is obtained from it.

I'RIS, in Greek mythology, the swift golden-winged messenger of the

Olympian gods. Iris was originally the personification of the rainbow, though she does not appear as such in the Homeric poems. She is represented with wings attached to her shoulders and a herald's staff in her left hand, representative of her office of messenger. In Hesiod she is represented as the daughter of Thaumas and Electra, and sister of the Harpies. Alcæus and other writers say that she was the wife of Zephyrus and the mother of Eros.

IRIS, circular, coloured membranous curtain in front of the crystalline lens of the eye and having a central aperture known as the pupil. It is provided with radial and circular muscle fibres, which enable the iris to contract and enlarge, thus regulating the amount of light entering the eye.

IRIS, a plant that gives name to the nat. ord. Iridaceæ, and is also called flag and fleur-de-lis. The plants of the genus Iris, some of which are medicinal and others merely ornamental, are found in many localities over Europe, Asia, and America. They usually grow in wet places, bearing flowers of various colours, but the prevailing tint is blue.

The common British species, *I. pseudacŏrus*, has yellow flowers. The stinking iris (*I. fœtidissima*) of Southern England has purple flowers and ill-smelling leaves. Orris-root consists of the root-stock of some species, as *I. florentina*; and the root-stock of this and other species are cathartic or emetic. Many beautiful species are grown in gardens, such as the Persian (*I. persica*), the snake's head (*I. tuberŏsa*), the Chalcedonian, the Spanish, the English, the German, and the Japanese.

IRISH ACADEMY, ROYAL, a learned association in Dublin established in 1782, and incorporated in 1785. The Academy, governed by a council of twenty-one members, has been publishing important Irish MSS. which it has collected in its valuable library.

IRISH FREE STATE (*Saorstat Eireann*), the larger of the two political divisions of Ireland. It has an area of 17,024,481 acres, and a population of 2,971,992 (census 1926, decrease of 166,886 since 1911). For constituent counties, geography, history, &c., *see* IRELAND.

Constitution and Government. By the treaty with Great Britain signed in 1921 and incorporated in the Irish Free State (Agreement) Act, 1922, the Irish Free State has the same constitutional status in the British Empire as the self-governing dominions, and its relations to the Imperial Government and Parliament are the same as those of the Dominion of Canada. The Irish Free State Constitution Act, 1922, declares the Irish Free State to be a co-equal member of the British Commonwealth of Nations, deriving all powers and authority from the people of Ireland.

The legislature (*Oireachtas*) consists formally of the king, represented by the Governor-General, a Chamber of Deputies (*Dail Eireann*) and a Senate (*Seanad Eireann*). The treaty embodied an oath of fidelity to the king and allegiance to the Constitution; but in 1932–33 the De Valera government abolished the oath and made other changes affecting the status of the crown, as represented by the Governor-General (*see* IRELAND, HISTORY). The executive consists of a council of five, six, or seven ministers, including its President, who is appointed on the nomination of the Dail. The usual channel of communication with Britain is the Dominion Office. Erse is the national language, but English is equally recognized for official purposes.

Religion. In the Irish Free State there are 2,751,269 Roman Catholics, 164,215 Protestant Episcopalians (members of the Church of Ireland, disestablished in 1869), 32,429 Presbyterians, and 10,663 Methodists. There is complete religious toleration.

Education. Elementary education is free (and in most districts compulsory), and secondary education is frequently in the hands of religious orders. There are two universities, Dublin University (Trinity College) and the National University of Ireland, which comprises the University Colleges of Cork, Galway, and Dublin.

Defence, &c. There is a Defence Force. The Imperial Government is responsible for sea and coastal defence, until in the case of the latter the Free State is in a position to undertake it. The capital is Dublin, and other towns (all sea or river ports) are Cork, Waterford, Wexford, Limerick, Galway, Sligo, Dundalk, Queenstown (*Cobh*), and Arklow.

Production and Industry. Of the total surface 11,727,034 acres were in crop and pasture in 1931, 2,100,000 acres in mountain grazing, and 236,230 acres under forests. In 1931, 2,313,189 acres were under hay, 622,779 under oats, 346,073 under potatoes; other crops are turnips, barley, mangels, wheat, &c. In spite of the rich soil, however, agriculture is generally in a backward state. Dairy farming and stock rearing are of great importance, and in 1932 there were 4,013,000 cattle and 3,461,000 sheep. Horse-breeding is also extensively carried on. Sea-fish-

eries employed 12,055 men in 1930, and the value of the yield in 1931 was £222,138. Inland fisheries are also of great value, and it is estimated that salmon worth £172,944 was taken in 1929. The annual coal production is about 90,000 tons. The chief manufacturing industries are brewing, distilling, the making of poplin (at Dublin), lace, and woollens, ham and bacon curing, and tobacco manufacture.

Commerce. In 1932 the total value of exports was £25,798,000, and of imports £42,572,000. Exports to and imports from Britain in 1931 were valued at £31,217,981 and £35,728,937 respectively, the corresponding figures for Northern Ireland being £3,725,978 and £5,040,085. The greater part of the exports represented articles of food and drink, which included live-stock, fresh and salt meat, bacon, ham, dairy produce, eggs, whisky, &c.

Communications. There were in 1931 3,027 miles of railway track, and waterways include the Royal Canal (96 miles), the Grand Canal (353 miles, including navigable rivers), and the navigable part of the Shannon (157 miles).

Mr. Cosgrave was President of the Executive Council of the Irish Free State from 1922 till 1932, when he was succeeded by Mr. de Valera, whose party, *Fianna Fail*, was returned to power at general elections in 1932 and 1933. Mr. de Valera's policy, which included the abolition of the Oath of Allegiance and the non-payment to Britain of land annuites, is directed towards independence and the development of domestic self-sufficiency both in political and economic matters.—

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IRISH SEA, the sea between Great Britain and Ireland, north of St. George's Channel and south of the North Channel, 130 miles long and about 60 miles wide.

IRISH TERRIER, a breed of dog that has become very popular of recent years; an animal of medium size, rather strongly built and wiry, rough-coated of a yellowish or reddish colour, very intelligent and affectionate.

IRI'TIS, is inflammation of the iris of the eye. It is marked by pain in the orbit and forehead (usually worse at night), by redness and injection of the surrounding conjunctiva, and by contraction of the pupil. It may arise as the result of direct injury, or from the spread of inflammation of the surrounding parts of the eye (secondary iritis), or it may be due to some germ deposited from the blood stream in the iris and setting up the inflammation. When the condition is chronic the pain and injection are absent, but there is usually considerable discoloration, and there may be deposit of cells forming masses which appear on the back of the cornea as dots. Recurrent attacks lead to atrophy of the iris.

Treatment. Atropine should be instilled into the eye to dilate the pupil as soon as possible, and in the early stages cocaine may be used with it to relieve the pain. Dry heat in some form should be applied over the eye, and if the pain be very severe, leeches should be applied to the temple. When the condition is due to some general constitutional disease, appropriate treatment for this disease should be carried out.

IRKUTSK, city of Siberia, Soviet Russia. It is 40 miles from Lake Baikal, on the Trans-Siberian Railway. Its trade is concerned chiefly with the smelting of metals. Pop. 103,900.

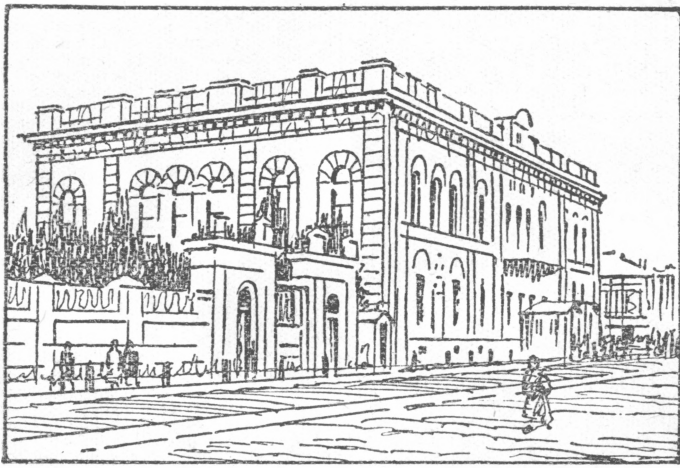
IRLAM, an urban district or town in Lancashire, at the confluence of the Irwell and Mersey. In 1920 the boundary between Cheshire and Lancashire was altered, and parts of Carrington and Partington, in Cheshire, were made part of Irlam. Pop. 12,898.

IRON, the commonest and best-known metal; symbol, Fe (Lat. *ferrum*); atomic weight, 55·84. It is so ductile that it can be drawn into wire as fine as the human hair, and two pieces can be perfectly welded together when raised to a white heat. It occurs in the earth's crust as compounds of iron in many minerals, and occasionally *native* or in the metallic state. There are two varieties of native iron, the *telluric* and the *meteoric*. The former occurs in small quantities only, in grains and thin plates, associated with lead and copper in rocks of volcanic origin. It is of a steel-grey colour. Meteoric iron is a pale steel-grey solid, very malleable and tough, flexible but not elastic. It has been found in masses in various parts of Europe, Africa, and America, and derives its name from having travelled through the air in the form of meteors, and having been brought to the earth from outside space by the attraction of gravity. All the specimens of meteoric iron analysed contain nickel, most of them also cobalt, besides copper, manganese, and other elements.

Ores. The commercial metal is ob-

tained from ores of iron, and always contains small amounts of impurities, especially carbon and silicon, and usually sulphur and phosphorus. The ores are very numerous, but the oxides, carbonates, and sulphides are the most important, and, from the manufacturing point of view, the following are the most valuable: (1) *Magnetic Iron Ore*, Fe_3O_4. This, the richest of all the ores of iron, contains, when pure, 72·4 per cent of metallic iron. It is iron-black in colour, with a metallic lustre, highly magnetic (especially the specimens of it that are called *native loadstone*), and extremely infusible. Some mountains in Lapland and Chile consist almost entirely of gneiss and granite, both in beds and veins. Great Britain has rich deposits of hæmatite in Cumberland. France, Germany, Russia, and North and South America have large deposits of the crystalline variety.

(3) *Brown Iron Ore, Brown Hæmatite.* This variety consists essentially of hydrated ferric oxide, and contains when pure about 60 per cent of iron, along with about 16 per cent of combined water. Brown iron ore occurs plentifully in France, Germany, Belgium, and in England, chiefly in the Forest of Dean, in Devonshire, Lincolnshire, and near Durham. Brown hæmatite is generally a yellow powder, sometimes passing into a brown or vel-



An aspect of modernity in buildings in Irkutsk, capital of Southern Siberia

this variety of ironstone. In Sweden it exists in great abundance and purity, and the bar-iron produced from it is much in demand by steel manufacturers. It is plentiful also in Norway, Russia, the East Indies, China, and the north-east part of the United States. Various parts of Great Britain also possess deposits of magnetic ore. Its specific gravity varies from 4·24 to 5·4.

(2) *Hæmatite* or *Specular Iron Ore, Red Hæmatite*, Fe_2O_3, or ferric oxide. This mineral in its purest state contains about 70 per cent of iron. Specular ore is deep steel-grey in colour, with a brilliant, and often iridescent tarnish externally; its fracture exhibits a brilliant lustre. It is opaque in large fragments, but the edges of small thin scales are of a blood-red colour by transmitted light. This ore is found in the older rocks, especially

vet black. Before the blow-pipe it blackens and magnetizes, but after calcination and cooling the powder becomes red, and in this state is much used for polishing metals. *Bog iron ore* is a variety of brown hæmatite which occurs in most European countries, and is so named from its being chiefly found in marshy places.

(4) *Spathic Iron Ore.* This mineral, as the name implies, resembles rather an earthy than a metallic substance. It consists essentially of ferrous carbonate, $FeCo_3$, and when pure contains 48·2 per cent of iron. It occurs in the older rocks in veins and beds, among the chief deposits being those in Styria and Westphalia, the Pyrenees, Columbia, and Great Britain. Spathic ironstone is often associated with considerable quantities of clayey and coaly matter; when the former

substance predominates, the ore is known as *argillaceous* or *clay ironstone*; when the coaly matter is in excess, the ore is called *carbonaceous* or *black-band ironstone*. These varieties occur in several of the coal-fields of Great Britain. The colour of the clayey carbonates of iron varies from reddish-brown through yellow-brown to dark brownish-black.

(5) *Iron Pyrites*, FeS_2. This mineral, when pure, consists of 46·5 per cent of iron combined with 53·5 per cent of sulphur, and is the most widely distributed of all the ores of iron. It occurs in many forms disseminated in rocks, veins, and beds, and is frequently found in coal-seams. The United States have immense deposits of it. The ordinary colour is brass-yellow. Before the blow-pipe it burns, giving out a sulphurous odour, and leaving a blackish residue, which is magnetic. This mineral is chiefly used as a source of sulphur in sulphuric acid factories, and the residues from the acid-works are now treated by a sintering process to reduce the amount of sulphur remaining, and to agglomerate the fine material into lumps suitable for the blast-furnace. In Siberia it is worked for the small percentage of gold it contains. The amount of iron ore raised in Britain is not now so great as formerly, and much is imported, especially from Spain.

Roasting. Before certain ores, such as brown hæmatites, spathic iron ore, clay ironstone, and black-band iron ore pass into the smelter's hands they are subjected to the preliminary process of *calcination* or *roasting*. The object of this operation is to eliminate water, carbon dioxide, sulphur, and other volatile substances, to oxidize ferrous compounds to ferric, and at the same time to render the ore more porous. This is now generally effected by placing the ironstone over a coal-fire at the bottom of a kiln; when the ore is red hot a fresh layer, 8 or 9 inches in depth and mixed with coal, is added, and so on until the kiln is filled. When the bottom layer is cold, it can be withdrawn, and the process thus becomes continuous. The old and wasteful method of calcining in the open air is now rarely used, except in the case of black-band ore.

Smelting. The *smelting* of the iron is the next process, that is, the production of the metallic iron from the ore. The iron-smelter must carefully consider the nature of the ores to be treated, and the due admixture of different varieties; the most suitable fuel; the production and maintenance of a high and even temperature; and he must also select such materials, *fluxes*, usually limestone, to mix with the ores as shall form a fluid slag with the gangue and deleterious substances in the ore. This slag floats on the surface of the molten iron, and flows away automatically. As it cools it sets to a grey solid, and can then be broken up and used as road-metal or for other useful purposes. The most advantageous combination of ores can be determined from chemical analyses. Until the beginning of the seventeenth century charcoal was exclusively used for iron-smelting, but coal and coke have now taken its place, except in those countries where forests still abound and charcoal can be procured readily and cheaply.

Chief among iron-smelting appliances is the blast-furnace, and the great progress made in the production of pig-iron during the past thirty years is largely due to better-constructed furnaces. In all modern furnaces the waste gases of the furnace are utilized for raising heat and steam, with a consequent large saving in fuel, and the residual or by-products which were formerly lost are also collected, all tending to reduce cost of manufacture. (*See* BLAST-FURNACE.) The molten iron, as it runs from the furnace, is generally conducted, along channels formed in strong bindings and, into moulds of the same material, in which it solidifies, forming what is known as *pigs*.

For casting purposes the pig-iron is generally remelted in a special furnace, called a cupola furnace. This apparatus consists of a cylindrically-shaped furnace, varying from 10 to 15 feet high, and having an internal diameter of about 3½ feet. The furnace is composed of thick iron plates strongly riveted together, protected inwardly by a layer of binding sand about 9 inches thick, the whole being lined with fire-clay bricks. The molten iron run from the blast-furnace may also be cast directly. *See* CASTING.

To obtain *malleable* or *wrought iron*, it is necessary to free the pig-iron from the sulphur, phosphorus, silicon, and excess of carbon it contains, as these substances render it unfit for rolling into bars or plates. A small quantity of carbon, varying from 0·1 to 0·2 per cent, generally remains in the wrought iron.

The means by which the elimination of foreign materials from the iron are accomplished are partial oxidation of the iron, succeeded by the removal of the foreign substances in the form of oxides, partly as gases and partly by combination with the already oxidized iron in the form of slag. This is done by the process of *puddling*, which is carried on in a reverberatory furnace. In the ordinary puddling-furnace there is a hearth, on which the

pig-iron is placed, and a grate separated from it, in which the fuel is placed. The bottom of the hearth consists of iron plates on which the working bottom proper is made up of oxidizing materials such as hammer scale, calcined tap cinder, the residue from pyrites burning, calcined iron ore, &c. The iron (about 4 cwt.) becomes heated by the hot gases that are allowed to play upon it, the shape of the furnace being designed to throw the heated gases down on to the surface of the molten mass on the hearth.

In the furnace there is a suitable aperture through which the puddler thrusts his rake or *rabble*, and so stirs up the metal for some ten minutes, thus assisting in the process of oxidation. The silicon and manganese become oxidized and form a slag, and a violent action, known as *the boil*, then occurs; this is due to the formation of carbon monoxide by a reaction between the carbon in the iron and the oxide of iron on the hearth, which burns in jets at the surface. The whole mass then becomes pasty, and the phosphorus at this stage is oxidized, and passes into the slag. The metal is now worked into balls or *blooms* weighing each about 60 lb. When the whole of the metal has been collected into blooms, the door of the furnace is closed, and the temperature is raised to a full welding heat. The blooms are then carried to a powerful squeezer or to a steam-hammer. The melted slag is thus forced out of the ball, which is at the same time welded into a compact mass of metal, ready to go through the *rolling-mill*, which consists of two sets of grooved iron cylinders.

The *roughing rolls* have Gothic and diamond-shaped grooves, roughened so as to grip the iron, and the *finishing-rolls* rectangular channels. These cylinders revolve in opposite directions, so that the metal in passing through them is powerfully compressed, whereby any slag remaining in it is squeezed out. The iron bars while still hot are cut into pieces by shears, which pieces are bound together by wire, and subjected to the operation of *re-heating* and *welding*. The bars are heated to a welding temperature, then again passed through the rolling-mill, whereby they are converted into a single bar. This bar may be again bent upon itself and again rolled, thereby producing what is known as *best bar* or *wire iron*. This iron is very tough and tenacious: it may be bent or even tied in a knot when cold without exhibiting the least sign of fracture.

If iron breaks off when bent in a cold state, it is said to be *cold-short*; while if it stands this treatment, but becomes brittle at a high temperature so as to be unfitted for welding, it is called *red-* or *hot-short*. The presence of foreign elements influences these two properties of iron in a marked degree; thus a very small amount of sulphur, even such a quantity as ·05 per cent, causes bar-iron to become red-short. Bar-iron possesses a specific gravity varying from 7·3 to 7·9. The melting-point is estimated as being about 2700° F., that of cast iron 2000° F.

Iron is one of the metals which readily rust at the ordinary temperature, but only in the presence of moisture and carbon dioxide; the red product produced by the rusting is hydrated ferric oxide, and it dissolves readily in acids. The metal dissolves readily in nitric acid, evolving copious red fumes. Dilute sulphuric acid dissolves it readily and hydrogen is evolved, but usually contaminated with small amounts of other gas, and it thus has an obnoxious odour. The product formed in the solution is ferrous sulphate. If this is allowed to stand, *green vitriol* crystals, $FeSO_4$, $7H_2O$, are deposited. The metal also dissolves in dilute hydrochloric acid, yielding hydrogen and ferrous chloride. When the metal is heated fairly strongly with concentrated sulphuric acid, it yields sulphur dioxide, SO_2.

In recent years 'malleable castings' have been introduced. The castings are made of white cast iron, and rendered malleable by the removal of the carbon. This is accomplished by embedding the castings in powdered red hæmatite in iron boxes, which are kept at a temperature of about 1650° F., or cherry-red heat, for a length of time varying from 12 to 72 hours, according to the type of casting treated. On cooling, the castings are found to consist of nearly pure iron, and to be fairly malleable, and therefore workable.

If iron is heated frequently or carelessly, it ceases to be fibrous and loses its tenacity; it is then said to be *burnt*. To restore it to its original condition, a fresh and very careful forging is generally needed.

It is not always easy to distinguish sharply between iron and steel, and many varieties of metal come into the market under the name of steel which in reality are alloys of iron with other metals, such as tungsten, manganese, chrome, &c. It is admitted by all metallurgists that one of the characteristics of true steel is that it hardens when heated and then suddenly cooled in water; but tungsten steel, for instance, hardens when cooled in air.

Experienced workmen can distinguish iron from steel by the musical note emitted on striking. A more certain method consists in treating the metal with diluted nitric or sulphuric

acid. If the surface remains unaltered, or nearly so, when touched with a drop of either acid, the metal is iron; in the case of steel a black mark will be left, owing to the liberation of carbon. If a small piece of the metal be highly polished on very fine emery-paper, and examined by a magnifying lens or low-power microscope, considerable quantities of slag will be visible in wrought iron, but not in steel.

Pure iron is a silver-white metal, with a high lustre, very tenacious, capable of receiving a high polish, and so soft as to be easily cut with a knife. It may be obtained by heating pure ferric oxide in a stream of hydrogen, or by electrolytic deposition, a method which has recently found important applications in technical work. In its chemical analogies iron is closely related to the metals cobalt, nickel, and chromium, and forms a large series of salts.

Iron Manufacturing Countries. The principal iron manufacturing countries are the United States, Great Britain, Germany, France, and Belgium. Great Britain, once the world's greatest producer of iron, has lost that position, and for years after the Great War the industry, except for brief spells, was in a very depressed condition. In 1928 the world's output of pig iron was 88,000,000 tons. The greatest producer was the United States, with 36,600,000 tons. Germany and France each produced over 10,000,000 tons, and Great Britain only 6,700,000 tons. In the three years before the war (1911-13) the production in Great Britain averaged 9,700,000 tons. The decline is partly due to the tariffs imposed by foreign buyers, and to the partial exhaustion of the reserves of iron ore, making the industry dependent upon supplies from abroad.

The world's production of iron ore is about 60,000,000 tons. The greatest known reserves are in Sweden.

For the manner in which iron is converted into steel, *see* STEEL.

Medicinal Value of Iron. Besides its numerous other uses, iron is of great value medicinally, especially as a tonic and restorative of the blood. Hence it is very efficacious in anæmia and chlorosis, in rickets and scrofula, and in convalescence from various illnesses. In neuralgia it is often beneficial, and especially when given along with quinine. Some of its preparations have a styptic or astringent effect. It is given in many forms, as the carbonate, citrate, sulphate, perchloride, &c. Mineral waters often owe their useful properties to iron, being then known as chalybeate springs.—BIBLIOGRAPHY: W. Macfarlane, *The Principles and Practice of Iron and Steel Manufacture*; Thomas Turner, *The Metallurgy of Iron*; A. M'William and P. Longmuir, *General Foundry Practice*; O. F. Hudson and G. D. Bengough, *Iron and Steel*.

IRON BACTERIA. The capacity for abstracting iron from the waters in which they live, and collecting it in the form of ferric hydroxide on their surfaces, is possessed by several kinds of micro-organisms that thrive in fresh water. Among these this peculiar physiological activity is possessed in the highest degree by certain of the organisms that are classed under the term bacteria. The best known are the following: *Leptothrix ochracea* (Kützing), *Gallionella ferruginea* (Ehrenberg), *Spirophyllum ferrugineum* (Ellis), *Crenothrix polyspora* (Cohn), *Cladothrix dichotoma* (Cohn), *Clonothrix fusca* (Schorler). All these belong to the higher bacteria, which differ from the lower bacteria, e.g. the bacillus, coccus or spirillum (*Schizomycetes*), in the possession of a thread-like or a band-like structure, and in somewhat more complicated methods of reproduction.

At certain seasons of the year they are apt to multiply with extraordinary rapidity, and cases are known in which great anxiety has been caused by the rapid growth of iron bacteria in reservoirs and water conduits. Such a case occurred in 1896 in the reservoirs which supply Cheltenham with water: in less than a week the reservoirs assumed the appearance of a dirty horsepond.

Their rapid multiplication is almost always associated with waters which are alkaline in reaction, and which have their gathering-grounds wholly or partly from land of a peaty or boggy nature. A very slight organic content in the water supplies them with all the food which they require. During their growth the iron which is associated with the organic molecule is brought out of solution and precipitated in the substance of, or on the outer surface of, the wall of the organism. As a result the volume of the organism is increased two or threefold. After its death the organism sinks to the bottom of the water, and remains there as a rusty-red particle of almost pure ferric hydroxide. The beds of ferruginous streams are almost always made up of countless bodies of such organisms.

IRON CORPS, the name applied to the 3rd Corps of the German army, which greatly distinguished itself in the Franco-Prussian War of 1870. The name was also applied to the first Siberian Corps of the Russian army during the European War.

IRON CROSS, a German, originally a Prussian, military order, first instituted in 1813 by Frederick William III as a reward for services against France. The badge is a cast-iron Maltese cross with a milled silver edge. The order

The Iron Crown of Lombardy

was reinstituted in 1870 for all Germany. It has three grades, and is divided into military and civil divisions. For civilians the ribbon is white with two black stripes, for military recipients it is black with two white stripes. Nearly three million iron crosses were awarded in Germany during the European War.

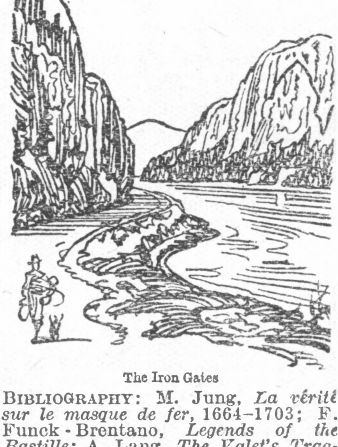
IRON CROWN, a golden crown set with precious stones, with which anciently the Kings of Italy, and afterwards the German Emperors, were crowned, when the latter assumed the character of Kings of Lombardy or Italy. It has received the above name from an iron circle in it, forged, according to tradition, from a nail of the cross of Christ. It was worn by Charlemagne, by Charles V, and by Napoleon I, who crowned himself with it at Milan in 1805. In 1866 it was given up by Austria to Victor Emmanuel on the conclusion of the peace. The crown, carried off by the Austrians in 1859, was restored in 1866 to Monza, where it is still preserved in the church of St. John the Baptist.

IRON GATES, a narrow part in the course of the Danube between Orsova and Turnu Severin, in South-West Roumania. It was formerly dangerous to shipping owing to rocks and rapids, the river being confined between steep precipices; but between 1890 and 1900 an artificial channel was made.

IRON MASK, THE MAN WITH THE, an unknown personage kept in various French prisons, who for a long time excited much curiosity. All that is known of him is that he was above middle height, of a fine and noble figure, and delicate brownish skin; that he had a pleasant voice, was well educated, and fond of reading and guitar playing, and that he died in the Bastille in 1703. The mask he wore seems to have been of black velvet, not iron.

Conjecture has given him many names. He was stated to be in turn the Count of Vermandois (a natural son of Louis XIV and de la Vallière), the Duke of Beaufort, the Duke of Monmouth, the son of Anne of Austria (mother of Louis XIV) by some favourite, and twin-brother of Louis XIV, but all these assertions have been unable to stand the test of thorough investigation. The last is made use of by Dumas père in *L'Homme au Masque de Fer.*

What seems most probable is that he was Count Ercole Mattioli, first minister of the Duke of Mantua, who had betrayed the interests of Louis XIV by failing to secure for him, as he had pledged himself to do, in consideration of a large bribe, possession of the fortress of Casale, which gave access to the whole of Lombardy. For this offence the court of Versailles lured him to the French frontier, and secretly arrested and imprisoned him in the fortress of Pignerolo. The secret was preserved so carefully—on the supposition that Mattioli was the ill-fated prisoner—because his seizure and detention were flagrant violations of international law. Another theory is that the man with the iron mask was the person called Eustache Dauger, imprisoned in July, 1669.—



The Iron Gates

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IRONMOULD, name given to reddish stains on cotton or linen fabrics. It is due to the action of soluble salts of iron, as in the case of ink which

usually contains ferrous sulphate. The red colour is due to the presence of ferric oxide, and the stain may be removed by the use of oxalic acid.

IRONSIDE, Sir William Edmund, British soldier. Born 6th, May 1880, he saw active service in South Africa, and in 1914 was a staff officer. In 1918–19 Ironside became prominent as Commander of the British forces at Archangel, and later he was in Persia. In 1928 he went out to India to command the Meerut district. Since 1931 he has been Lieutenant of H.M.'s Tower of London and since 1932, Colonel Commandant of the Royal Artillery. He was created K.C.B. in 1919.

IRONTON, a city of Ohio, United States, on the River Ohio, 140 miles above Cincinnati, the centre of an iron-producing district. Pop. 16,621.

IRON-WOOD, a name given to various trees from the quality of their timber. The iron-wood or hop-hornbeam of America (*Ostrya virginica*), nat. ord. Cupuliferæ, is a tree with a trunk not exceeding 6 inches in diameter, with very hard wood, so heavy that it sinks in water, and foliage resembling that of birch. Other trees thus named are species of Sideroxylon, Metrosideros, Mesua, and Inga.

IROQUOIS (ĭ'ro-kwą), the joint name given by the French settlers in Canada to a once-powerful confederacy of five North American Indian tribes (Mohawks, Oneidas, Senecas, Cayugas, and Onondagas), to which was added after 1726 the Tuscaroras, thus making the famous Six Nations. They formerly resided on the Mohawk River, and extended their conquests to the Mississippi, and beyond the St. Lawrence. It is probable that but for the settlement of the whites they would have secured dominion from Canada to the Gulf of Mexico. Some of the tribes are now extinct; some have made considerable advances in civilization, while others have fallen into a state of squalid misery. Part of the Canadian Indians are Iroquois.

IRRADIATION, exposure to light rays. Both the luminous and the ultra-violet rays of sunlight are employed in therapeutics, and artificial sunlight is produced by the use of the carbon arc or mercury vapour lamp. By the irradiation of inactive ergosterol (q.v.) this substance becomes a powerful source of the anti-rachitic vitamin D. *See* VITAMIN.

IRAWADI, or **IRRAWAD'DY,** a large river traversing Upper and Lower Burma from north to south, falling into the Indian Ocean by various mouths and forming a great delta. Its sources are in lat. 28° N., in mountains between Burma and Eastern Tibet. The Irawadi is the main artery of Burma, much trade is carried on by its means, the valleys through which it flows are very fertile and populous, and on its banks are the principal towns (Mandalay, Ava, &c.), with Rangoon and Bassein on two of its mouths.

The width of the river varies from 200 yards above Ava to 1 to 4 miles towards its delta, and the total length is estimated at 1,200 miles. It is navigable for steamers of 5 feet draught as far as Bhamo near the Chinese frontier, 900 miles from its mouth. The Irawadi Flotilla Company possesses a large number of steamers specially constructed for the navigation of this river.

IRREDEN'TISM (*irredenta,* unredeemed), a term applied in Italy to a movement created for the purpose of delivering Italy from foreign rule and dominion. The movement arose during the second half of the nineteenth century, after the formation of the Kingdom of Italy, and especially after the Berlin Congress of 1878. The Irredentists claimed all the territories which had an Italian-speaking population, such as the Trentino and Trieste from Austria, Malta from Great Britain, and Corsica from France. Irredentism ceased to be an influential factor at the beginning of this century, but at the outbreak of the European War the Irredentists became again very active. At the Paris Peace Conference their requests were conceded, as nearly all the districts then claimed by them, with the exception of Fiume (q.v.), were returned to Italy.

IRRIGATION, the art of increasing the productivity of soils by the artificial supply of water to them. This is as old as agriculture, and references to it exist in very early records, especially in Egypt, India, and China. Irrigation and land drainage are intimately associated, for were the soil kept flooded with water the end in view would not be attained.

It is clear that water-supply is a controlling factor in the production of crops, for even when dry these contain more than 50 per cent of water, while in the fresh condition the percentage ranges from 75 to 90. It is also necessary to take into account the water which is evaporated or transpired from the leaves and stems, and all that is either evaporated or fails to be held by capillarity and percolates through the soil to the water-table. It has been calculated, for example, that the production of 1 ton of dry substance by the oat crop has been associated with the loss of over 500 tons of water in these three ways.

Even in England, where the average annual rainfall is from 25 to 35 inches, it is necessary to husband the water in the soil, especially during dry seasons, by such cultural operations as harrowing, rolling, and hoeing; and in some parts of the country there are 'water' meadows which are irrigated by periodic flooding. In semi-arid regions with a rainfall of from 10 to 15 inches it is found possible to conserve the moisture of the soil by the methods of 'dry' farming, so as to secure a crop every other year, or two crops in three years. In such cases irrigation would be necessary for the production of an annual crop, and in areas with still smaller rainfall agriculture is only possible when irrigation is practised. A large part of Mesopotamia, for example, which is now desert was once rendered fertile in this way, and it would be possible to make it so again.

The character of the water supplied by irrigation is by no means a matter of indifference, for its value largely depends on the amount of plant-food it holds in solution. When this is high the manure bill is reduced, thus diminishing the cost of treatment. A good example is afforded by sewage-farms, where the main object is not to supply water but fertilizing ingredients.

In any system of irrigation it is of course necessary to bring water from a greater or less distance, and preferably from a higher level. Pumping operations become necessary when it is conveyed from a lower level, and the cost of these are often prohibitive. In all cases the surface inequalities must be removed by some kind of levelling, for otherwise it would be impossible to secure even distribution of water.

Methods. There are two chief methods of irrigation: (1) flooding, (2) furrow irrigation. *Flooding.* Here the whole surface is covered with water, either by allowing a thin layer to run over it continuously, or by supplying all that is required by means of a single operation. In the former procedure water is liberated from a distributing furrow, and in the case of a well-marked slope there is a series of such furrows. In water-meadows there is a supply ditch running along the top of the slope, and from this the water flows down a series of distributing furrows placed on ridges, overflowing from these to submerge the ground, and draining below into a second ditch. The alternative method of flooding is much used on fairly level ground, especially in the case of closely growing crops, such as rice, lucerne, and clover. Here the water passes from a canal or other source of supply into a system of ditches, which gradually overflow until the ground is submerged to the extent desired.

Furrow irrigation is applicable to all sorts of crops, including fruit-trees, which are grown in rows. The rows must follow the slope of the ground, and the furrows are cut out between them.

Irrigation is largely practised in South Europe, Algeria, Egypt, India, Australia, and the United States. It has played an important part in the development of the British Empire.—BIBLIOGRAPHY: J. Scott, *Irrigation and Water Supply*; King, *Irrigation and Drainage*; F. H. Newell, *Irrigation Management*; A. P. Davis and H. M. Wilson, *Irrigation Engineering.*

IRRITABILITY IN PLANTS, the property of reacting by movements, &c., to external agencies, of which the most important are gravity, light, contact, temperature, water, oxygen, and many other chemical substances; these agencies are termed *stimuli*, and the resulting reaction is called a *response.* All living organs are more or less irritable, but some responses are more striking than others, notably the quick movements induced by contact in the case of irritable stamens (barberry, Sparmannia) and stigmas (Mimulus), the sensitive plants (Mimosa, &c.), some insectivorous plants (Dionæa), and so forth. *See* CHEMOTROPISM; GEOTROPISM; HAPTOTROPISM; HELIOTROPISM. — BIBLIOGRAPHY: Charles Darwin, *Power of Movement in Plants*; L. Jost, *Lectures on the Physiology of Plants.*

IRTHLINGBOROUGH, urban district of Northamptonshire. It stands on the Nen, and is 82 miles from London. Boot-making is the chief industry. Pop. (1931), 1,609.

IR'TISH, a large river of Northern Asia, rises in the Altai Mountains in Chinese territory, forms Lake Zaisan, then flows N.N.W. through Asiatic Russia, and after a course of 2,600 miles falls into the Ob'. It receives the waters of several important rivers, and has important sturgeon fisheries.

IRÚN (ē-rụn'), a town in the north-east of Spain, province of Guipúzcoa, near the Bidassoa and the French frontier, 8 miles east of San Sebastian. There are thermal springs in the vicinity. Pop. 11,921.

IR'VINE, a royal and municipal burgh and sea-port of Scotland, in Ayrshire, on the Irvine, 24 miles south-west of Glasgow. It has a good harbour, and there are chemical-works (for explosives, &c.), engineering-, foundry-, and shipbuilding-works. Pop (1931), 12,032.

IRVING, Edward, the founder of the sect called Irvingites, was born Aug., 1792, at Annan, Dumfriesshire, died at Glasgow, Dec., 1834. After a good education at Annan he went in 1805 to the University of Edinburgh, and, having entered the ministry of the Established Church, he was appointed in 1819 assistant to the celebrated Dr. Chalmers in Glasgow. In 1822 he became minister of the Caledonian Asylum Chapel, a Presbyterian place of worship in London. His impressive eloquence, combined with singularity of appearance, and his mannerisms, soon brought him into notice, and for a time the great as well as the fashionable flocked to hear him.

In 1823 he published a work called *For the Oracles of God, Four Orations*, which sold extensively. About two years later he wrote an *Introductory Essay to Bishop Horne's Commentary on the Book of Psalms*, considered one of the best products of his pen.

His theological peculiarities were well set forth in a collection of *Sermons, Lectures, and Occasional Discourses* (3 vols.), issued at London in 1828. These attracted much attention, and brought him shortly afterwards into conflict with the Presbytery, with the result that in 1832 he was dispossessed of his living in London, and in 1833 the presbytery of Annan, which had licensed him, deposed him from the ministry. He was charged with holding Christ guilty of original and actual sin, and denying the doctrines of atonement, satisfaction, imputation, and substitution. He was a believer in the speedy coming of Christ, and held that miraculous gifts of apostolic times had not ceased to be bestowed on the Christian Church. *See* IRVINGITES.—BIBLIOGRAPHY: Mrs. F. W. Oliphant, *Life of Edward Irving*; E. Miller, *History and Doctrine of Irvingism*.

IRVING, Sir Henry (originally John Henry Brodribb), an English actor, born 6th Feb., 1838, died 13th Oct., 1905. He was for a time a clerk in London, but adopted the theatrical profession, his first appearance being at Sunderland in 1856. After playing for nearly three years in Edinburgh he appeared at the Princess's Theatre, London, in 1859. After a short stay here, and a few months in Glasgow, he went to Manchester, where he remained for five or six years.

Having returned to London in 1866, he took part in *The Bells, Stratagem, Hunted Down*, and *Uncle Dick's Darling*; but his first marked success was as Digby Grant in Albery's *Two Roses* (in 1870), which was followed by his powerful impersonation of Mathias in *The Bells* (founded on Erckmann-Chatrian's *Le Juif Polonais*). His next noteworthy parts were Charles I, Eugene Aram, and Richelieu, in the plays so named. In 1874, at the Lyceum Theatre, he sustained the part of Hamlet so successfully as to raise himself to the first place among English actors. His chief Shakespearian parts subsequently played are Macbeth, Othello, and Richard III.

In 1878 he leased the Lyceum Theatre for himself, and then put upon the stage in excellent style *Othello, The Merchant of Venice, Much Ado About Nothing, Romeo and Juliet, Twelfth Night, Faust, Macbeth*, &c., playing in them the principal characters along with Miss Ellen Terry.

Henry Irving as Hamlet

His appearances in the provinces were as successful as those in London, and he met with equal favour in his visits to the United States. He contributed papers to the magazines on subjects connected with his art, and delivered addresses at Oxford and Harvard Universities. He was knighted in 1895.—BIBLIOGRAPHY: W. Archer, *Henry Irving, Actor and Manager*; A Brereton, *The Life of Henry Irving*; B. Stoker, *Personal Reminiscences of Henry Irving*; G. Craig, *Henry Irving*.

IRVING, Henry Brodribb, British actor-manager and author, eldest son of Sir Henry Irving, born in London, 5th Aug., 1870, died 17th Oct., 1919. Educated at Marlborough College and New College, Oxford, he was called to the Bar in 1894. He soon, however, gave up law and followed in his father's footsteps. In 1891 he had already appeared in Sir John Hare's company,

and in 1894 he was with Comyns Carr at the Comedy Theatre. From 1896 to 1900 he acted with George Alexander at the St. James's Theatre. Among the characters which Irving impersonated were the title-rôle in Sir. J. M. Barrie's *The Admirable Crichton* and *Hamlet*. He was also successful in *The Lyons Mail* and *Dr. Jekyll and Mr. Hyde*. His works include: *French Criminals of the 19th Century*, *The Trial of Mrs. Maybrick*, and *The Life of Judge Jeffreys*.

IRVING, Washington, American man of letters, born in New York 3rd April, 1783, died 28th Nov., 1859, at Sunnyside, on the Hudson. He was the son of a Scotsman who had emigrated to New York before the Revolution, and had become a merchant of some standing. Although educated for the legal profession, his tastes were in the direction of literature, and already in 1802 his *Letters of Jonathan Oldstyle* appeared in the *New York Morning Chronicle*. Shortly afterwards, being threatened with pulmonary disease, he sailed for Europe, visited most Continental countries, and did not return to America until March, 1806. In the same year he was called to the New York Bar.

His pen was now very busy, and his sketches of Dutch character, in his *Knickerbocker's History of New York*, which made its appearance in December, 1809, proved him possessed of quaint and genial humour to a high degree. About this time he joined his two brothers as a sleeping partner in a mercantile venture, and in 1815 he visited England. The failure of his brothers' business made him resolve to follow literature as a profession, and he settled in London. A series of papers which he now wrote, entitled *The Sketch-book*, first published at New York, 1818, met with such success that an enlarged edition was published in London two years later.

For seventeen years until 1832 Irving resided in Europe, principally in England, France, and Spain. This was a period of great literary activity, and brought forth some of his most famous works, such as *Bracebridge Hall*, *The Tales of a Traveller*, and *The Life of Columbus*, for which 1,000, 1,500, and 3,000 guineas respectively were paid him by the publishers. He also acted for a time as secretary to the American Embassy in London, and the University of Oxford honoured him in 1831 with the degree of D.C.L.

Having returned to New York in the spring of 1832, he accompanied the expedition for the removal of the Indian tribes beyond the Mississippi, and collected the material for his *Tour on the Prairies*, published in 1835. From 1842 to 1846 he acted as United States Ambassador at Madrid, and on his return in that year he retired to his country seat at Sunnyside. His *Life of Oliver Goldsmith* (1849), *Mohammed and his Successors*, and the *Life of Washington* (1855–6) occupied his last years.

Other works of his are: *The Conquest of Granada*, *Tales of the Alhambra*, *Legends of the Conquest of Spain*, *Voyages of the Companions of Columbus*, *Adventures of Captain Bonneville*, and *Astoria*. His famous story of *Rip van Winkle* belongs to the *Sketch-book*. —BIBLIOGRAPHY: P. M. Irving, *Life and Letters of Washington Irving*; W. C. Bryant, *Discourse on the Life, Character, and Genius of Washington Irving*.

IRVINGITES, a name given to believers in, and followers of, Edward Irving, forming a sect properly designated as the Catholic Apostolic Church. They have some churches in the United Kingdom, and a few unimportant congregations exist also in Germany, France, Switzerland, Canada, and the United States. They are supposed to number about 5,000 adherents in Great Britain, and about 20,000 in Germany and Switzerland.

Their chief distinguishing feature is the belief in a revival of the spiritual gifts of the first ages of the Church, such as speaking in 'unknown tongues,' and prophesying. In their Constitution, which they claim to be a development of the primitive Church, they adopted the fourfold ministry of apostles, prophets, evangelists, and pastors and teachers (*Eph.* iv, 11). Two years after Irving's death the number of apostles had been completed to twelve. They recognize all Christian communities, and embody in their ritual portions of those used in different sections of the Church, including the Roman and Greek Catholic. The ministry is supported by tithes. The members expect the second coming of Christ to take place soon.—Cf. E. Miller, *History and Doctrine of Irvingism*.

IRWIN, Baron. English politician. Edward Frederick Lindley Wood was born 16th, April 1881, being the son and heir of Viscount Halifax. In 1910 he was elected Unionist M.P. for the Ripon Division, and in 1922 he was made President of the Board of Education. Later he went to the Ministry of Agriculture. In 1926 he was made Viceroy of India, and he remained there for five eventful years, returning home in 1931. He was made a baron in 1926. In July, 1932, he joined the National Government as Minister for Education, a post he still held in 1933.

ISAAC (Heb. *Yishāk*, he will laugh from *sāhak*, to laugh), one of the Hebrew patriarchs, the son o

Abraham by Sarah, so called to denote the *laughter* and *gladness* occasioned by his birth. He is remarkable for his miraculous escape from death as a burnt-offering; and for the fraud perpetrated upon him, at his wife Rebecca's instigation, by his son Jacob, to the injury of Esau. He died at Hebron when 180 years old, and was buried in the cave of Machpelah, the resting-place of Sarah and Abraham, and of Rebecca.

ISAAC I, *Comnenus,* Emperor of Constantinople, raised to the throne in 1057. He brought about great reforms in the administration of the empire, and repelled an inroad of the Hungarians, but abdicated in favour of Constantine Ducas in 1059, and retired to a convent, where he died in 1061.

ISAACS, Sir Isaac Alfred, Australian lawyer, born in Melbourne, 6th Aug., 1855. In 1880 he became a barrister, and from 1892–1901 he sat in the Legislature of Victoria, serving also as solicitor-general and attorney-general. In 1901 he was elected to the House of Representatives of the Commonwealth, and in 1905–06 he was its attorney-general. In 1906 Isaacs left politics to become a judge of the high court. In 1930 he was promoted to be Chief Justice of the Commonwealth, and in 1931 he was appointed Governor-General.

ISABELLA OF CASTILE, daughter of King John II of Castile and Leon, consort of Ferdinand the Catholic, was born 1451, married 1469, and died 1504. She was a woman of great charms, courage, and sagacity, and contributed no small share to the many remarkable events of the reign of Ferdinand V, including the introduction of the Inquisition (1480), the discovery of America by Columbus (1492), and the final expulsion of the Moors after the conquest of Granada. —Cf. M. Hume, *Queens of Old Spain.*

ISABELLA II. ex-Queen of Spain, daughter of Ferdinand III, was born in 1830, died in 1904. She succeeded her father in 1833, her mother being appointed queen-regent. The early years of her reign were disturbed by a rising in favour of her uncle, Don Carlos, who, if the Salic law had not been set aside, would have ascended the throne instead of her; but this was finally quelled in 1839. She was declared of age in 1843, and in 1846 was married to her cousin, Don Francisco d'Assisi.

Her reign was so despotic that a revolution took place in 1868, which drove her from the country. She resigned her claims to the crown in favour of her son Alfonso XII, who ascended the throne in 1875. After 1871 she lived sometimes in Spain, sometimes in Paris, where she died.— Cf. E. B. D'Auvergne, *A Queen i Bay.*

ISÆ'US, an Athenian orator, who lived between 420 and 348 B.C. He was a pupil of Lysias and Isocrates, and, like them, became a teacher of rhetoric and writer of orations, chiefly judicial. Eleven of his orations are extant. His style is clear, forcible, and concise. He was a skilful forensic pleader, and a master of logical reasoning. His speeches almost all

Isabella of Castile, Consort of Ferdinand 1451-1504

belonged to the law-courts; he seldom spoke on public questions. He was celebrated for his flow of language.

ISAIAH, the son of Amoz, in some respects the greatest of the Hebrew prophets, lived during the second half of the eighth century B.C. Little is known about his personal history, but, from some allusions in his writings, we learn that he was a man of some social standing in Jerusalem, with a wife and at least two sons. He was not a priest. But his first vision of God came to him in the temple, about 740 B.C., "the year that King Uzziah died." He felt driven, at this crisis, to undertake the rôle of warning his nation against its moral carelessness and its political infatuation. From this it may be inferred that he

was born about 760 B.C. He appears to have been an active figure in Jerusalem for about forty years, and the main episodes of his career fall within three periods, (*a*) 740–722, (*b*) 722–705, (*c*) 704–701.

(*a*) During the reigning of Ahaz (735–728) he comes forward (*The Bible*: *Isaiah*: chapters ii–v) as a trenchant critic of the social and religious deterioration which accompanied Judah's material prosperity (vi–viii). The reformer indignantly declares that God will punish the nation for its luxury, its indifference to the poor, its formal religion, and its toleration of crime. But his threats include the promise that a surviving remnant will become the nucleus of God's true people. Later on, after the Assyrians had saved Judah by invading Israel, which had attacked her, Isaiah reiterates his warnings, which were climaxed by the final Assyrian victory over Samaria in 722, when the northern kingdom came to an end.

(*b*) Isaiah's advice, as a statesman, was always to avoid any alliance with Egypt on the south, or the Assyrians on the north and east. Non-intervention was his counsel. He was convinced that Judah's best policy was to keep clear of any interference or alliance with either of these great powers. As indeed it was, although the opposition evidently dubbed this a pusillanimous attitude, and worked for some open alliance. Isaiah's stern conviction is that Egypt is a broken reed, and that the Assyrians, instead of proving sure allies of these imperialistic Jews, will be God's instrument in punishing a nation like Judah which is ethically and economically ruining itself.

(*c*) Meantime, internal troubles in the Eastern realm gave a respite to Judah. But, when Sennacherib succeeded Sargon in 705, the end seemed to be near. In 702 he marched over into Palestine, prepared to crush Judah and the other states which had been tampering with rebellion. Isaiah suddenly believes that Jerusalem will be spared; he encourages King Hezekiah and the authorities to hold out, since God will not allow His sacred city to be demolished by the haughty Assyrians. Even at the darkest hour, when the Assyrians seem to have the city in their grip, the prophet never loses hope. He puts heart and faith into the panic-stricken leaders and citizens, and his foresight is vindicated. Sennacherib unexpectedly raises the siege. The predictions of Isaiah are brilliantly verified, and by the end of 701 the Assyrian retreat left Judah inviolate. The main passages relating to this supreme crisis are to be found in i, x, xxviii–xxix, xxx–xxxi, xxxiii, xxxvi–xxxvii.

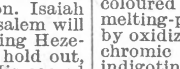
It may be in the glow of relief after this deliverance that Isaiah penned his vision of the ideal kingdom and king, which is preserved in xxxii, 1–5, 15–20; ix, 2–7; xi, 1–8. But Isaiah disappears at this point. When Manasseh succeeded Hezekiah, in 697, a pagan reaction broke out in Judah, and Jewish legend made Isaiah one of the martyrs in the persecution; he was alleged to have been sawn asunder with a wooden saw. Possibly he did perish during Manasseh's reign. But the end of his life, like its beginning, is quite obscure. He lives by the record of his career during the last forty years of the eighth century.

When his prophecies were collected afterwards, they were supplemented by others from various hands, e.g. xxiv–xxvii, xxxiv–xxxv, and by a series of post-exilic prophecies which in the canonical book of *Isaiah* fill xl–lxvi. His extant, authentic writings are enough, however, to prove his poetical genius, his indomitable faith in God as overruling history for moral ends, his political insight, and his impressive personality. "In his writings there is felt and mirrored every phase of the complex life of that city and people, whose soul was to him nearer and dearer than his own, and all without one trace of self-consciousness!" (W. A. C. Allen, *Old Testament Prophets*, pp. 141, 142).—

BIBLIOGRAPHY: Sir G. A. Smith, *Isaiah, I–XXXIX* (*Expositor's Bible*; S. R. Driver, *Isaiah: his Life and Times*; W. R. Smith, *The Prophets of Israel*; M. G. Glazebrook, *Studies in the Book of Isaiah*; G. B. Gray, *Isaiah, I–XXXIX* (*International Critical Commentary*).

ISAR (ē'zär), a European river which rises in Tyrol, about 6 miles north-east of Innsbruck, enters Bavaria, flows past Munich, and joins the Danube; course about 219 miles.

ISATIN, $C_8H_5O_2N$, an orange-coloured crystalline substance of melting-point 201° C., first obtained by oxidizing indigo with nitric acid or chromic acid. It is closely allied to indigotin, the colouring matter of indigo blue. Isatin played an important part in the researches which led to the synthesis of indigo from coal-tar products. It is the anhydride of *o*-aminophenylglyoxylic acid, and has the constitutional formula



It forms, with thiophene, a blue colouring matter indophenin ($C_{12}H_7NOS$), when added to a solu-

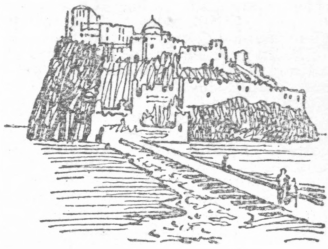
tion of thiophene in concentrated sulphuric acid. The characteristic colour produced serves to detect thiophene in benzene, in which it is a common impurity.

ISAU'RIA, in ancient geography, a country in Asia Minor, bordering on Lycaonia, Phyrgia, Pisidia, Cilicia, and Pamphylia. Its capital, Isaura, was destroyed by the Romans.

ISCHIA (is'ki-ä), an island of Italy, 26 square miles in extent, in the Gulf of Naples, with beautiful scenery and a fertile soil, producing excellent wine and fruits. It is entirely volcanic in character, and is noted for its warm mineral springs and volcanic convulsions. In 1881 and 1883 earthquakes caused great loss of life and property. Several shocks have been experienced since, but without disastrous results. The capital, Ischia, with some 7,000 inhabitants, is a favourite resort of tourists in Italy. Other towns are Casamicciola and Forio, both of which suffered severely in 1883. Pop. 27,361.

ISCHL (ē'shl), a fashionable watering-place in Upper Austria, on the Traun, 50 miles S.W. of Linz, celebrated for its salt baths. The former Austrian Emperor had a residence in the neighbourhood. Pop. (district), 9,875.

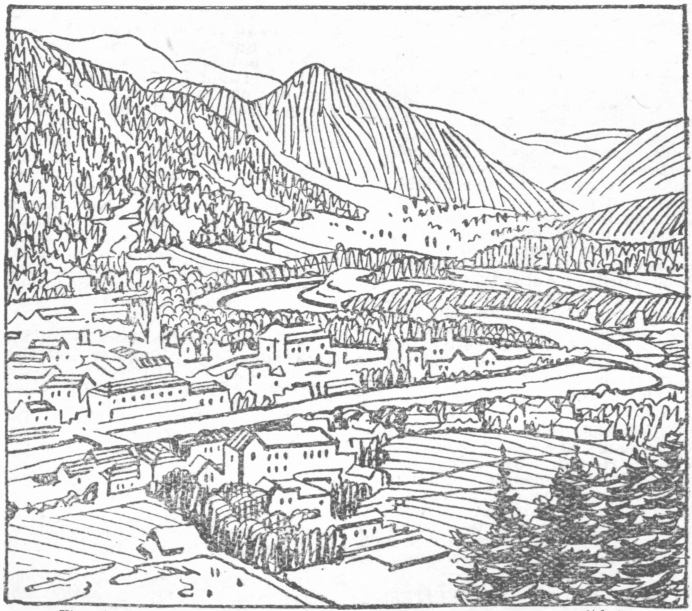
ISEO (ē-sā'ō), or **SABINO,** a picturesque lake in Upper Italy, be-



Ischia with 15th century castle

tween Brescia and Bergamo, and formed by the waters of the Oglio; length, 15 miles; average breadth, 6 miles.

ISÈRE (ē-sār), a river which rises in Italy, crosses Savoy, enters France by the department of Isère, to which it gives its name, and joins the Rhône 5 miles above Valence; length,



View of Ischl, a fashionable watering-place in Upper Austria—celebrated for its salt baths

about 180 miles, of which nearly 90 miles are navigable.

ISÈRE, a department of South-Eastern France; area, 3,178 sq. miles. It is generally mountainous, the highest summit being Le Grand Pelvoux, 13,158 feet. The whole department belongs to the basin of the Rhône, which drains great part of it directly, the only other important river being the Isère. The soil is generally fertile, and produces abundant cereal and leguminous crops, the vine and mulberry being also cultivated. Lead, copper, and iron are found in considerable quantities; also coal, marble, slate, granite, and porphyry, and the iron-mines employ a number of blast-furnaces. There are numerous paper-, silk-, and cotton-mills. Grenoble is the capital. Pop. (1931), 584,017.

ISERLOHN (ē'zēr-lōn), a town of Germany, in Westphalia, with manufactures in brass, bronze, tin, and iron, cutlery, zinc and iron furnaces, &c. Pop. 30,820.

ISFAHAN (is-pȧ-hän'), or **ISPAHAN**, a very ancient city of Persia, and for centuries its capital, in the province of Irak-Ajemi, on the River Zendarud, 200 miles south of Teheran, the present Persian capital. It was once one of the most important and magnificent cities in the East, but little is now left of its former splendour, the largest part of the city being in ruins.

The manufactures are still extensive, however, including trinkets, fire-arms, sword-blades, glass, earthenware, artistic brasswork, woollens, cottons, velvet, and satin. Much opium is grown in the neighbourhood, as also are tobacco and madder, forming important articles of trade.

Ispahan is an important emporium of the inland commerce of Persia, and is a centre for the distribution of goods from Britain, Russia, India, &c. British goods arrive partly by way of Bushire, on the Persian Gulf, coming via Shiraz, or they may enter the country by way of the River Karun and the town of Ahwaz. The town was occupied by the Russians during the European War (in 1915). Pop. 100,000.

ISHMAEL (Heb. *Yishmael*, whom God hears), the son of Abraham by Hagar. He married an Egyptian wife, and had twelve sons and one daughter, who became the wife of Esau. He died when 137 years old. It was predicted that he was to become 'a great nation,' and the Arabs, especially the Bedouins, are often regarded as descendants of Ishmael.

ISHMAELITES, ISMAELITES, or **ISMAELIANS,** a Mahommedan sect originating in the first century of the Hegira, and deriving its name from Ishmael or Ismael, one of Ali's descendants. From the eighth to the twelfth century they were powerful in the East, made many conquests, and under various chiefs and names distributed themselves over 'Iraq, Syria, Persia, and Egypt. A small remnant of them still dwell in Syria. *See* ASSASSINS.

I'SIDORE, the name of three Spanish ecclesiastics, of whom the most famous was Isidore of Seville, who flourished at the beginning of the seventh century. He was the most profound scholar, the most eloquent orator, and the ablest prelate of his age and country, and consequently exercised a powerful influence over the development of Latin Christianity. He was made Bishop of Seville in A.D. 600 or 601, presided over the Councils of Seville, 619, and Toledo, 633; and died at Seville, 636. Several of his works, which embrace divinity, history, and philosophy, were translated into English as early as the middle of the sixteenth century. His *Etymologies* were edited by W. M. Lindsay in 1912.

I'SINGLASS, a variety of gelatine prepared from the swimming-bladder or sound of the sturgeon, dried and cut into fine shreds. The American article is obtained from the same part of the cod and hake. It forms the basis of Russian glue, which is a very strong adhesive. Isinglass is largely used in cooking for the preparation of nutritious jellies, for clarifying sherries and other white wines, for making mock pearls, and for stiffening linens, silks, and gauzes, or thickening milk. The adhesive material of court plaster consists of isinglass mixed with a small proportion of some balsam. By means of a solution of isinglass in water, tannic acid may be distinguished and separated from gallic acid, the former giving a yellowish-white flocculent precipitate.

I'SIS, the principal goddess of the Egyptians, the daughter of Seb (Earth) and Nut (Heaven), and the sister and wife of Osiris, representing the moon, as Osiris did the sun. She became the mother of Horus, the sun-god, also called Horus the Child, and distinguished from Horus the Elder, a son of Seb and Nut, and, therefore, a brother of Isis. The Egyptians believed that Isis first taught them agriculture, and as the Greeks offered the first ears gathered to Ceres, so did the Egyptians to Isis.

She is represented under various forms. In one representation she has the form of a woman, with the

horns of a cow, as the cow was sacred to her. She is also known by the attributes of the *lotus* on her head, and the *sistrum* in her hand, a musical instrument which the Egyptians used in the worship of the gods. She is often accompanied by her infant son Horus. In one celebrated Egyptian statue she was shown with her face veiled. She was particularly worshipped in Memphis, but at a later period throughout all Egypt.

From Egypt her worship passed over to Greece and Rome, and the abuses which it occasioned at Rome caused its frequent prohibition there. It was, however, repeatedly revived. The Romans never considered the worship, which was introduced among them by Sulla (86 B.C.), altogether reputable, and its attendant immorality was vigorously lashed in the satire of Juvenal. Under the empire the cult of Isis became very popular, and among the priests of the goddess were Domitian, Commodus, and Caracalla.—Cf. Sir E. A. W. Budge, *Egyptian Religion*.

ISIS, a kind of coral, popularly known as *Mare's-tail* coral, from its likeness to the plant of that name (Hippūris). It is found chiefly in the Indian Seas, in the Pacific Ocean, and on the coasts of America.

ISIS, name given to that part of the Thames that flows past Oxford. *See* THAMES.

ISLA, José Francisco de, born at Segovia 1714, died at Bologna 1783, a Spanish satirist after the model of Cervantes. His fame rests principally upon his *History of Friar Gerundio*, a satire on the monks of his time, a book which fell under the ban of the Inquisition. He translated *Gil Blas* into Spanish, and in his introduction to it by way of a jest propounded the theory that Le Sage stole his famous rogue-novel from Spain. This jest was taken seriously by several wiseacres, and the echoes of the controversy thus aroused have not yet died down.

ISLAM (is-lām′), the name given in the *Koran* to the religion founded by Mahomet. It is the infinite form of *islama*, to resign oneself, or to profess Islam. It does not imply, as it is often supposed, complete resignation and submission to the will of God, but means striving after righteousness. The fundamental doctrine of Islam, and the only one it is necessary to profess, to be a Moslem, is expressed in the common formula of faith: "There is no God but God, and Mahomet is his prophet," to which the Shiahs or Shiites, that is, the majority of Persian and Indian Moslems, add "and Ali is the vicar of God." Islam embraces all four sects now found among the followers of Mahomet. *See* MAHOMMEDANISM.—Cf. F. A. Klein, *The Religion of Islam*.

ISLAND, in physical geography, a piece of land surrounded by water, but islands are of all types and of all sizes, from mere dots of land or rock in the sea, probably due to the submergence of mountains whose summits they represent, to a great mass like Australia, which is regarded as a continent.

Islands are divided into two distinct classes: *continental* islands, lying in proximity to continents, and *pelagic* or *oceanic*, from their position in the oceans. Continental islands

Temple of Isis at Philæ

occur along the margin of the continents, and are generally of the same geological structure. Pelagic islands are mostly of volcanic or coral formation. A cluster of islands, such as the West Indies, the Canaries, or the Hebrides is called an *archipelago*.

ISLAY (i′lā), an island of Scotland, one of the Inner Hebrides, forming part of Argyllshire, and separated by the Sound of Islay from the Island of Jura. It is 25 miles long by 19 miles broad; area, 235 sq. miles. The coast is mostly bold and rocky, and the north and east of the island are hilly. There are extensive fertile tracts under tillage, producing good crops of grain, turnips, and potatoes. Cattle, sheep, horses, cheese, butter, and other agricultural produce are exported, as also large quantities of whisky, distilled in the island and sent chiefly to Glasgow. Pop. (1931), 5,743.

ISLEHAM, village of Cambridgeshire, 17 miles from Cambridge and 8 from Newmarket, on the L.N.E. Rly. Near is **Isleham Fen,** which was partly drained by prisoners of war in 1918–19. Pop. 1,650.

ISLEWORTH, town of Middlesex. It stands on the Thames, 8½ miles from London, on the S. Rly. There are some manufactures. With Heston, Isleworth forms an urban

district. Pop. of district (1931), 18,556. *See* HESTON.

ISLE OF PINES. *See* NEW CALEDONIA.

ISLES, LORD OF THE, one of the titles of the Prince of Wales, but formerly borne by the chieftains and rulers of the Western Isles of Scotland. The Lords of the Isles traced their descent from Somerled, who appears in Scottish history in the middle of the twelfth century, during the reigns of David I and his grandson Malcolm IV. Angus of the Isles gave his fealty to Bruce. The last regular lord was John, who forfeited his title in 1493. —Cf. A. Lang, *History of Scotland.*

ISLINGTON, one of the 28 boroughs of the county of London. To the north of the city, it is reached by tube railways, tramways and motor omnibuses. Holloway forms the north of the borough, which is the second largest in London. Aberdeen Park is a residential district and Finsbury Park is a great traffic centre. Pentonville, with its prison, is also in the borough. The name *Merrie Islington* was given to the district because of the pleasure gardens that existed here in the eighteenth century. Pop. (1931) 321,712.

ISMAIL (is'mâ-il), or **ISMAILIA,** a town of Rumania, in Bessarabia, on the north arm of the Danube, 35 miles E. of the Rumanian port Galatz, and about 40 miles from the embouchure of the Danube in the Black Sea. It was destroyed by Suwarrov in 1790, and since then has been alternately governed by Turkey and Russia, ultimately falling under the dominion of the latter by the Treaty of Berlin in 1878. Under Rumania it has made rapid strides, both architecturally and commercially, and is now an important market for wool, hides and leather, corn, and tallow. Pop. 26,132.

ISMAILIA (is-ma-ē'lē-â), a town of Egypt, on the salt lake Timsah, on the route of the Suez Canal, near where the freshwater canal from the Nile forks, one branch going to Suez, another to Port Said. It arose during the making of the Suez Canal, and was the head-quarters of Sir Archibald Murray during the European War (in 1916). Pop. 10,000.

ISMAY, Thomas Henry, English shipowner. Born at Maryport, 7th Jan., 1837, his father was a shipbuilder and he himself entered a shipping office in Liverpool. In 1867 he bought the ships which formed the nucleus of the White Star Line, and with his partner, William Imrie, developed this line enormously. He died 23rd Nov., 1899.

ISMET PASHA, Turkish statesman. Born in 1884, he entered the army in 1903 and took part in the Young Turk revolution in 1908 and served in the Great War. Joining the national party he reorganized its forces. In 1922 he was foreign minister and since 1924, as prime minister of the new republic, he has taken a leading part in the reorganization of the country.

ISMID, or **IZMID,** a town of Turkey in Asia Minor, on the Sea of Marmara, seat of a Greek metropolitan and an Armenian archbishop. It represents the ancient *Nicomedia.* Pop. 55,000.

ISOC'RATES, an ancient Greek orator, born at Athens, 436 B.C. He spoke seldom in public; but he prepared orations for others, and trained many able orators, among his pupils being Isæus, Hyperides, and Lycurgus. His patriotism was sincere, and his desire for the freedom of Greece so intense that he starved himself to death in his ninety-eighth year from grief at the unhappy battle of Cheronæa. He was master of a graceful literary prose style, but was accused of being too florid and elaborate. Twenty-one of his orations are still extant.—Cf. Sir R. C. Jebb, *Attic Orators.*

ISOËTES, a genus of Lycopods, including some fifty temperate and tropical aquatic herbs, with a short tuberous stem and a tuft of awl-shaped leaves (hence the popular name quill-wort). They are heterosporous, the bulky sporangia being embedded singly in the bases of the leaves.

ISOGAMOUS PLANTS, those in which the male and female gametes are alike. Opposed to heterogamous plants.

ISOM'ERISM (Gr. *isos,* equal, *meros,* a part), a chemical term first used by Berzelius in 1831. Substances which have the same percentage composition and the same molecular formulæ are now regarded as *isomeric,* e.g. ethyl alcohol and dimethyl ether, which differ considerably in chemical and physical properties, have the same formula, C_2H_6O. The isomerism is supposed to be due to different grouping of the atoms within each molecule.

ISOMORPH'ISM (Gr. *isos,* equal, *morphē,* form) is the name given to the phenomenon of substances with analogous chemical formulæ crystallizing in crystals of exactly the same shape. It was formerly supposed that every substance had its own peculiar crystalline form. Mitscherlich, however, showed that certain elements or groups of elements may replace one another without altering the crystalline form of the compound. Thus the alums are

isomorphous, and crystallize in well-defined octahedra; and a crystal of potash alum, if immersed in a concentrated solution of ferric alum, will grow in the solution, the successive layers being layers of ferric alum instead of potash alum. Iron has replaced potassium in the compound without altering the crystalline form.

—**ISONZO**, a river in Italy, formerly in Austria, rising in the Julian Alps and falling into the Gulf of Trieste. The towns of Gorizia, Plezzo, and Tolmino lie on its banks. During the European War fierce fighting took place between the Italians and the Austrians on the banks of the Isonzo. Several battles were fought during 1915, 1916, and 1917, the fighting in the district ceasing in May, 1917.

ISOP'ODA (Gr. *isos*, equal; *pous*, *podos*, foot), an order of crustaceans having sessile eyes and a depressed body; the thoracic and abdominal rings free, except the first thoracic, which is united with the head. The feet are of equal size and move in the same direction. The Isopoda vary widely in habits; some, like the woodlice, are terrestrial, and inhabit damp situations, such as under stones, and moss, and under the bark of trees; others live as parasites on fishes, and in the gill-chambers or on the outer surface of shrimps, crayfish, &c.; and whilst some forms are exclusively marine, others inhabit fresh water.

ISOS'TASY, a theory in geology and geodesy.—**Geology.** Surface areas that receive a load of sediment washed down from the uplands tend to press towards those uplands, which are at the same time being lightened of their load. There is thus an isostatic conservation of earth-features; the mountainous masses, though undergoing prolonged denudation, tend to rise.

Isostasy does not account for the earth-pressures that produce crumpled mountain-chains; but it is a cause of the perpetuation of these chains. The mountains are conceived as masses of lesser density floating in denser matter belonging to lower layers of the crust, which supports them by its lateral thrust.

Geodesy. Gravity surveys, conducted generally with the pendulum, find by actual measurement the resulting effect of gravitation and of centrifugal force due to the earth's rotation. Gravitation varies inversely, however, as the square of the distance between the centre of the earth (from which the attraction of the earth's mass is supposed to act) and the place of experiment. It is also affected by any mass above mean sea-level which is, as it were, super-imposed on the theoretical figure of the earth at this spot (*see* GEODESY; GRAVITY). In order to make measurements of gravity universally comparable, they are reduced to mean sea-level by eliminating the effect of extra height and of superimposed masses.

Bouguer in his famous experiment in Peru proceeded on the supposition that the earth's crust was rigid, and that any superimposed mass was wholly additional to that of the theoretical figure of the earth.

His formula for reduction to mean sea-level was

$$g' = g + (1 - 3\delta/4\Delta)2gh/r,$$

where g' is the observed gravity,

g ,, gravity at sea-level,
h ,, elevationabovemean sea-level,
r ,, radius of the earth,
Δ ,, mean density of the earth,
δ ,, density of the local and super-imposed mass.

Observed results for g give, however, discordant values when treated in this way, and the discordance is almost always in such a sense as to imply that the additional effect due to superimposed mass has been exaggerated.

The late Professor Helmert is perhaps the most famous geodesist who has treated observed values of gravity on the assumption that the additional mass due to height above mean sea-level is counterbalanced or compensated by an equivalent lack of density in the underlying portion of the earth's crust, but that the net result is a compensation at mean sea-level itself. Consequently in his reduction formula he omits the term which allows for the attraction of the superimposed mass, and takes into account only the additional distance from the earth's centre.

Helmert's 1901 formula, obtained by this method (the 'free-air method'), is

$$g' = g + \frac{2gh}{r}.$$

Again, however, the reduced results for g are not harmonious. In place of negative residuals (found in the Bouguer reduction), the free-air method gives, on the whole, positive residuals, implying that the superimposed mass is not to be ignored.

Arguing from these premises, geodesists have advanced the theory of *isostasy*, which agrees generally with observed results. The theory considers the interior of the earth as homogeneous, and the crust to be yielding and to some extent viscous. In this crust it is postulated that masses above mean sea-level are compensated for by underlying regions of deficient density,

and that areas of extra density underlie ocean-beds. We may then consider a number of cylinders of equal section thrust downwards in the direction of the plumb-bob through the crust to rest upon an equipotential surface.

The theory of isostasy argues that the masses enclosed in these cylinders will be equal, and that although V (the volume) will vary, δ (the density) will vary in an equal and opposite sense. Each of these cylinders will, however, exert its influence upon the pendulum, and since this influence may be considered as acting from the centre of gravity, the height of the centre of gravity will determine the direction of the resulting attraction. We may also divide this attraction into components due to the mass above mean-sea-level and the underlying depth of compensation.

It is to be noted that the theory of isostasy may be tested both by pendulum (or gravity) measurements and by measurements of the inclination of the plumb-bob. The former deals with the intensity of the attraction, the latter with its direction.

It is apparently to Major C. E. Dutton that the name 'isostasy,' used by him in 1889, is due, but the theory has been known and accepted by geodesists and geologists for many years. The first extended mathematical treatment of the subject was given by Archdeacon Pratt in his investigations on the deflection of the plumb-bob in India from 1859 onward.

A theory of such wide application needs confirmation from a careful arrangement and analysis of measurements at stations covering a wide area. The Coast and Geodetic Survey of the United States of America has supplied a mass of such measurement, and it is due to Hayford and Bowie of that survey that we have the calculations and the analysis which has placed the general truth of the theory beyond question. The survey of India, under Sir Sydney Burrard, has contributed to its experimental confirmation.

At the present moment it may be said that the depth of compensation appears to be about 70 to 80 miles, and acts as if it were concentrated at a depth of from 20 to 30 miles. It appears to vary somewhat according to the geological formation, and to allow of considerable local deviations from the general law.—BIBLIOGRAPHY: *Survey of India* (Professional Paper, No. 13); *United States Coast and Geodetic Survey* (Special Publications, Nos. 10, 17, and 40).

ISOTHERMAL LINES, lines drawn on a map or globe through places which have the same mean annual temperature. (*See* CLIMATE.) *Isothermal lines* are drawn through places having the same mean temperature during the hottest month of the year. *Isocheimenal* or *isocheimal* lines are drawn through places having the same mean temperature during the coldest month of the year.

ISOTOPES, elementary substances with the same chemical properties, but different atomic weights; or, elements with different atomic weights, but the same atomic number (*see* MATTER; NUMBER, ATOMIC), and the same place in the *periodic table* (q.v.). According to modern theory, as developed by Sir E. Rutherford and others, and now fairly well established, an atom is built up of a certain number of unit positive charges of electricity, or *protons*, with an equal number of unit negative charges, or *electrons* (q.v.).

The positive charges, in which practically all the mass of the atom resides, are concentrated in a nucleus of minute dimensions, closely bound to some of the negative charges. Only those electrons which are outside the nucleus take part in chemical changes. The number of outside electrons, or the *net* number of positive charges in the nucleus, is the atomic number. Elements with the same atomic number ought therefore to be chemically alike, and elements with the same gross number of protons ought to have the same atomic weight.

If an element loses one proton and one electron from the nucleus, its atomic weight will be reduced by 1, but its atomic number and its chemical properties will not be changed. The new element will be an *isotope* of the old. This theory has been verified in two main ways, the one depending on the facts of radio-activity (q.v.), the other on a series of remarkable experiments by F. W. Aston, working with a developed form of Sir J. J. Thomson's positive ray analysis (*see* RAYS, ELECTRIC). Aston's results form a contribution of the very highest interest and importance to our knowledge of the structure of matter.

The element lead is the end product of various series of radio-active changes. The uranium series (e.g.) ends with a product which has a theoretical nuclear charge 82, the same as that of lead. This product is derived from radium by five α-ray changes. The atomic weight of radium is 226, and each α-ray change, or loss of a helium atom, lowers the atomic weight by 4. The atomic weight of the final lead should therefore be 206, whereas ordinary lead has an atomic weight 207·2.

It has been completely verified by experiment that the final product of the uranium series is chemically identical with lead, but has the at. wt. 206. Many other examples of this

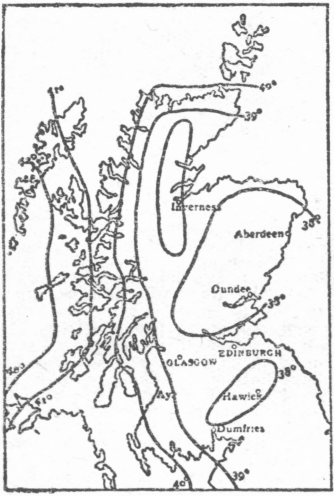
type are known, and the existence of isotopes among radio-active bodies is now beyond question.

Among the lighter and non-radio-active elements the first indication of the existence of isotopes was given by the experiments of Sir J. J. Thomson on the inert element neon. The atomic weight of neon is 20·2, but positive ray analysis gave *two* parabolas corresponding to atomic weights of 20 and 22. At first it was thought that neon is really not a single element, but a mixture of two distinct elements (as air is a mixture of oxygen, nitrogen, &c.), composed of 10 per cent of one element of at. wt. 22, and 90 per cent of another of at. wt. 20.

After the practical failure, however,

England—January Isotherms

England—July Isotherms



Scotland—January Isotherms

Scotland—July Isotherms

The figures represent the temperature in degrees Fahrenheit

of various attempts to separate the two components of neon, a somewhat different view of the matter came to be taken. It had long been observed as a curious fact that many atomic weights, on the basis of O = 16, are very nearly whole numbers; and, indeed, a theory, known as *Prout's hypothesis*, had been advanced in 1815 suggesting that every atom is built up of atoms of hydrogen, and that every atomic weight in terms of hydrogen is therefore a whole number. The theory did not stand the test of the exact determinations of atomic weight by Stas and others, who found that the at. wt. of chlorine, for instance, is 35·46 correct to the last figure.

The facts about neon, however, as well as the trend of theoretical speculation, suggested interesting possibilities for elements in general; and in 1919 Aston began systematic work to test whether there might not be some substratum of truth in Prout's idea after all. Aston uses an instrument which he calls the 'mass-spectrograph.' Positive rays, which are charged atoms and molecules moving at high speed, are generated in a large discharge tube, and pass through two fine slits in the cathode. The space between the slits, and the 'camera' in which the analysis takes place, are highly exhausted. The rays are deflected by being made to pass between two charged plates, and then between the poles of a powerful electro-magnet. It can be shown that rays of the *same mass* will come to a focus in a certain plane, and a sensitive plate is placed there. The record on the plate is therefore a *mass-spectrum*, and can be used to detect the presence of particular elements in the positive rays in much the same way as the ordinary solar spectrum is used for the discovery of elements in the sun.

Aston has investigated a large number of elements, chiefly non-metals, and he finds in all cases that an element either has an integral atomic weight, or else is made up of two or more isotopes with integral atomic weights, the chemical at. wt. in the latter case being therefore merely a statistical average.

Chlorine gave lines on the mass-spectrum corresponding to 35, 36, 37, 38, of which 35, 37 certainly belong to chlorine itself, the other two possibly to HCl. There was no sign of a line at 35·46. Among elements found to be single are helium, carbon, nitrogen, oxygen, fluorine, phosphorus, arsenic, sulphur, sodium, and cæsium. The accepted at. wts. of these are nearly whole numbers.

Boron, bromine, lithium, and potassium are composed of two isotopes each, with masses of 11, 10; 79, 81; 7, 6; 39, 41 respectively; the corresponding atomic weights are 10·9, 79·92, 6·94, 39·1.

Mercury (at. wt. 200·6) has several isotopes, ranging from 197 to 204; Brönsted and Hevesey, at Copenhagen, have succeeded by physical methods in partially separating these, with results consistent with those given by Aston.—BIBLIOGRAPHY: F. W. Aston, *Science Progress* (Oct., 1920); *Nature* (12th May, 1921); *Philosophical Magazine* (1919, p. 707; 1920, pp. 449, 611, 628; 1921, pp. 140, 436); J. N. Brönsted and G. Hevesey, *Philosophical Magazine* (1922, p. 31).

ISRAËLS, Joseph, Dutch painter, born at Groningen, of Jewish parents, in 1824, died 1911. He studied at Amsterdam and at Paris, and after returning to Amsterdam, finally settled at The Hague in 1870, where he became a prominent figure in the revival of Dutch painting associated with that town.

His first important picture was historical in subject, *William, Prince of Orange, Opposing the Decree of the King of Spain*, but soon he abandoned such subjects for scenes of working-class life, delighting especially in studies of fisher folk. Of this character are his *Children of the Sea* and *Evening on the Shore* (Salon, 1857).

Other important works of his are: *The Zandvoort Fisherman*, *The Silent House*, *Shipwrecked* (now in the National Gallery), and *The Bric-à-brac Seller*, whilst his etchings include: *Old Mary*, *The Cradle*, and *The Mother*. One of his latest paintings was *David Singing before Saul*. In the handling of his subjects he owes much to Rembrandt; and in the sources of his inspiration he is comparable to Millet, though he does not achieve that painter's dignity and breadth of treatment.

ISSIQ KÖL, or ISSYK-KUL, a lake of Central Asia, in the Kirghiz A.S.S.R., province of Semirechensk, south of Lake Balkhash, about 110 miles long by 36 miles broad, with brackish water abounding in fish. It is the largest of the upland lakes, lying in the heart of the Tian-shan at an altitude of 5,300 feet, and receives many streams, but is gradually decreasing in size.

ISSOUDUN (is-ö-dŭn; the Roman *Exoldunum*), a French town, department of Indre, 17 miles N.E. of the departmental capital, Châteauroux. It has manufactures of steam-engines, agricultural implements, tools and various articles in metal, and parchment. Pop. 10,246.

ISSUS, anciently a town of Cilicia, in Asia Minor, on the Gulf of Issus. Here Alexander the Great gained a complete victory over Darius (333B.C.).

ISTANBUL. *See* CONSTANTINOPLE.

ISTHMIAN GAMES, public games of ancient Greece, so called because they were celebrated on the Isthmus of Corinth, and having a similar character to the Olympian, Nemean, and Pythian games. The Greeks in general took part in them, and the principal exercises were boxing, wrestling, foot-, horse-, and chariot-races, and throwing the discus.

They were celebrated in April and May, in the first and third year of each Olympiad, and the victors were rewarded with wreaths of pine leaves. The origin of these games was lost in antiquity, but they were generally regarded as originated in honour of Poseidōn (Neptune). The regular celebration of the games was dated from 582 B.C.—Cf. E. N. Gardiner, *Greek Athletic Sports and Festivals.*

IS'TRIA, a peninsula of triangular form, projecting into the north-east corner of the Adriatic Sea. The surface is mountainous, particularly in the north. The soil is generally thin and gravelly; but the forests, which are extensive, yield excellent timber, and the vine, olive, and mulberry are successfully cultivated. It formerly belonged to the Austrian Empire, but passed to Italy in Nov., 1920, after the settlement of the Adriatic question. Area, 1,800 sq. miles. Pop. 350,000, of which a third are Italians, and the rest Croats and Slovenes.

ITALY, a kingdom in Southern Europe, consisting mainly of a peninsula stretching southwards into the Mediterranean, but including part of the mainland and numerous islands (Sicily, Sardinia, Elba, Ischia, the Lipari Islands, &c.). It is bounded on the north and north-west by the Alps, which separate it from Austria, Switzerland, and France, and on the north-east by Yugoslavia; elsewhere it is washed by the Mediterranean or the Adriatic.

Before the European War the area of Italy was 110,619 sq. miles, but by the Treaty of St. Germain (1919) there was considerable adjustment of the Austro-Italian boundary, Italy getting Trentino and Trieste, and by the Treaty of Rapallo (1920) she got Istria and the adjacent islands and Zara in Dalmatia. The Italo-Yugoslav Treaty (1924) gave Fiume to Italy. Rhodes (in Italian occupation since 1912) became definitely Italian by the Lausanne Treaty (1923). Under the same treaty Italy got the Dodecanese. The area is now 119,713, sq. miles; pop. (1931), 41,176,671.

It is divided into ninety-two provinces, which are divided in turn into 7,306 communes. Rome is the capital. The largest towns (in order) are Rome, Milan, Naples, Genoa, Turin, Palermo, and Florence. Italy possesses the territory of Eritrea on the Red Sea coast of Africa, a part of Somaliland (including Jubaland, ceded 1925), and Tripoli and Cyrenaica (Libia Italiana).

Physical Features. Amongst the principal physical features of Italy are the Alps on its northern frontiers, and the chain of the Apennines, which run down the middle of the peninsula through its whole length to the Straits of Messina, while numerous branches are thrown off laterally, and form an endless succession of wooded hills, olive-clad slopes, and fertile valleys. In the north, enclosed between the ranges of the Alps and Apennines, is a vast and fertile plain, intersected by the Po and its tributaries. Two active volcanoes belong to the kingdom, Vesuvius in South Italy and Etna in Sicily.

The eastern shore of Italy is generally flat and uninteresting, presenting particularly along its northern part a series of sandy islands and lagoons, which dam up the mouths of the rivers, and occasion the formation of pestilential marshes. On the west coast the same thing is occasionally seen, as in the case of the Pontine Marshes and the Tuscan Maremma; but as a rule the west coast is more elevated, and often presents delightful scenery, as round the Gulf of Genoa and the Bay of Naples.

The only river of any magnitude is the Po, which has a length of about 450 miles before it enters the Adriatic. It is fed by streams both from the Alps and the Apennines, the Ticino, Adda, Oglio, &c., from the former, the Trebbia, Secchia, &c., from the latter. The Adige (in Germany, the Etsch) has its mouth at no great distance from the Po, and is partly fed in the same way. In the peninsular part of Italy are the Arno, Tiber, Garigliano, Volturno, &c.,

There are a number of lakes, of which the most important are Lakes Maggiore, Lugano, Como, and Garda in the Alpine region; Lakes Trasimeno, Bolsena, and Albano in the Apennine region.

Italy is rich in useful minerals, but the scarcity of coal prevents the full development of mining industry. Sulphur, marble, zinc, salt, iron, and borax are the chief, though small quantities of lead, copper, silver, &c., are also obtained.

Climate. In the south of Italy the climate resembles that of Africa, being dry and burning and subject to the

sirocco. In the northern regions, the neighbourhood of the Alps, and the abundance of watercourses, serve to maintain a pleasant temperature. Yet this region is at times extremely cold, especially in the interior of the great plains. In general the climate of Italy is healthy, except in marshy districts such as the rice-plantations of Lombardy, the Tuscan Maremma, the Campagna of Rome, and the Pontine Marshes, which give rise to exhalations engendering fevers. The Riviera or coast of the Gulf of Genoa is a favourite winter-resort from more northern regions.

Vegetable Products, Agriculture. The natural productions of the soil of Italy are as various as its climate. In the Alpine regions all plants belonging to temperate climates flourish, while the southern regions possess almost a tropical flora. Agriculture forms the chief support of the population, and the land, where not mountainous, is generally productive, although the system of culture adopted is in most parts defective, and large areas remain untilled. The best cultivation, aided by an excellent system of irrigation, is found in Lombardy, Venetia, Piedmont, Tuscany, and the parts of Emilia adjoining the Po.

Most kinds of cereals, including rice and maize, are cultivated, and the wheat in particular is of fine quality, but is not sufficient for the home consumption. Hemp, flax, tobacco, hops, saffron, and, in the extreme south, cotton and sugar-cane are cultivated.

Fruits are the object of attention everywhere; and in the cultivation of the olive Italy surpasses all other European states. The fruits include oranges and lemons in the warm regions of the south, besides figs, peaches, apricots, almonds, &c. There is a very large production of wine, but only a few of the wines have any reputation in other countries. The rearing of live stock is an important industry. The cheese of Italy is famous, especially the Gorgonzola and the Parmesan.

Manufactures. Since the consolidation of the Italian kingdom, manufactures have made great advances, and electricity generated by water-power, derived from her mountain streams, has come much into use. Thanks to this fact Italy has changed from a purely agricultural country to an industrial one.

The silk industry is the chief, Italy as regards the production of raw silk being in advance of all the other countries of Europe. Lombardy, Piedmont, and Venetia are the great centres for the preparation of the raw silk and its manufacture into thread and tissues. The cotton manufactures are also centred in Upper Italy, chiefly in Lombardy, and have much increased. Woollen manufactures are also chiefly carried on in Upper Italy.

In the iron industry and in engineering the department of Lombardy stands at the head, more particularly the provinces of Brescia, Como, and Milan. Tanning, the manufacture of linen, of paper, gold and silver wares, musical instruments, gloves, boots and shoes, felt and silk hats, are also considerable industries.

The manufacture of tobacco is a State monopoly. Of special repute are the cameos and mosaics of Rome, Naples, and Florence; the filigree and coral work of Genoa; the plaited straw and the earthenware of Italy generally.

Trade. The foreign trade since 1914 has been mainly with France and Algeria, Great Britain, Switzerland, and the United States. In 1932 the imports, exclusive of precious metals, amounted to the value of 8,247,100,000 lire; the exports to 6,796,000,000. The chief imports are wheat, raw cotton, and cotton manufactures, coal, iron, and machinery, wool, sugar, coffee; the chief exports, raw silk, olive-oil, wine, fruits, eggs, coral, hemp, marble, rice, sulphur.

The principal ports are Genoa, Leghorn, Messina, Naples, Palermo, Venice, Brindisi, and Catania. The total length of railways opened for traffic in 1931 was 22,554 kilometres; 1,937 are electrified. It is proposed to electrify 287·8 kilometres. There were also 65,147 kilometres of telegraph lines, mainly belonging to the Government.

Constitution and Government. Fascism, under the leadership of Mussolini, has profoundly modified the constitution and government of Italy. The constitution of the Kingdom of Italy is a limited monarchy, based upon the Fundamental Statute granted by King Charles Albert to his Sardinian subjects, 4th March, 1848. The king, who is hereditary, exercises the power of legislation in conjunction with a national Parliament, consisting of two chambers. The first chamber is called the Senate, and was in the pre-Fascist period, composed of the princes of the blood, and an indefinite number of members appointed for life by the king. There were 365 senators and nine members of the royal family in 1932.

The second chamber is called the Chamber of Deputies, and consisted of 400 members, who were elected by a majority of all citizens above twenty-one years of age who can read and write, and possess certain other qualifications. The law of 1928

PALAZZO DE SENATORE, ROME

changed the whole electoral system. It made the suffrage universal not only for men above twenty-one, but also for men aged less than twenty-one years if married, or widowers with sons who are paying 100 lire in taxes, or receiving a pension from a public institution.

The principle of proportional representation was introduced by the Electoral Reform Act of 1919. The duration of Parliament was for five years. Each province had a separate administration, and a Provincial Council, the power of the State being represented by a Prefect, who was supported by a Council. The executive power of the State was exercised by the king through a Cabinet of responsible ministers.

Under Fascism many of these constitutional provisions ceased to operate. Italy has become a 'Corporative State.' By law, Mussolini is practically dictator and the king is obliged (by the law of December, 1925) to keep him in office as long as the present regime, political and economic, endures. His cabinet consists not of responsible ministers but of his executive officers, and legislation is entirely in his hands; no measure can be brought before the Chamber or the Senate without his consent; and measures he introduces, if rejected, can be brought up again in three months and must be ballotted upon forthwith without discussion. In 'exceptional circumstances' he can make laws himself, and can over-ride the law on matters concerning 'public institutions and institutions of public utility.'

The foundation of the new system is the Fascist Grand Council, with which is linked the congresses or councils of the 13 national federations of employers and workpeople forming the framework of the 'corporative' organization of industry. Under the electoral law promulgated in 1928 the number of deputies for the whole kingdom is 400, who are nominated by the Fascist organs—in the first place by the national federations of legally recognized syndicates; their nominations being the basis upon which the Fascist Grand Council selects the deputies—though the Council may go outside the candidates thus nominated—who go before the electors, the whole kingdom being regarded as one constituency. The Council's list must be voted upon, 'yes' or 'no' by the electors, the franchise being given to all males over 21 (or 18 if they are married and have children), who pay 100 lire in taxes or rates in the towns or own 500 lire in property, or who are paying members of the Fascist syndicates; Catholic clergy, State pensioners, and ministers of one recognized religious denomination other than Catholic are also entitled to vote. If the designated list of candidates is not approved, a second election is ordered with competing lists, selected by associations and organizations which have 5,000 electors; all candidates on the list which gets the highest number of votes are declared to be elected; the seats reserved for the minority being distributed in proportion to the votes recorded for each of the other lists.

The Fascist Grand Council is the supreme State organ, charged with responsibility for the whole regime introduced by the Revolution of 1922. Presidency of the Council belongs, of right, to the 'Chief of the Government' (Mussolini), who is Prime Minister and Secretary of State, appointed by and responsible to the king. The sittings of the Grand Council are secret. It will be its duty when the office of 'Chief of the Government' becomes vacant to submit the list of names to the king for the nomination of Mussolini's successor. Its secretary is the secretary of the Fascist party. Its members include, by virtue of office, the presidents of the Senate and chamber; ministers who are secretaries of state; the commanding officer of the national voluntary militia; members of the directory of the Fascist party; the presidents of the Academy of Italy and the Fascist Institute of Culture; and the presidents of various other recognized organizations. No proceedings of a disciplinary character can be taken against any of the members of the Council without its consent.

In 1933 the estimated revenue was 20,234,143,000 lire, the estimated expenditure 21,828,810,000 lire. The total internal debt amounted to 95,936,000,000 lire on 31st Dec., 1932.

Defence. All men capable of bearing arms are under obligation of military service from their twenty-first to the end of their fifty-fifth year. After passing through the ranks they are transferred to the reserve. The army is divided into the Metropolitan army and the colonial troops. In 1924 the Volunteer Militia was formed for national security.

The strength of the field army at the end of 1919 was 800,000, but in 1927 it had been reduced to about 300,000. The Metropolitan army in 1932–33 had 16,021 officers and 231,000 other ranks. Italy mobilized during the European War 5,615,000 men. The navy numbers (1932) 4 battleships, 3 armoured cruisers, besides protected cruisers, destroyers, torpedo-gunboats, submarines, and other craft.

In 1932–33 the Air Force had 2,500 aeroplanes and 24,650 officers and men.

Religion and Education. The Roman Catholic is nominally the State religion, but all other creeds are tolerated, and adherents of all religions had equal municipal and political rights in pre-Fascist Italy; but the Concordat (i.e. the Lateran Treaty of 1929) left the position of non-Catholic bodies in Italy somewhat vague, though they were raised from the status of 'tolerated' to 'admitted' faiths. The Pope has his seat at Rome, and his palaces of the Vatican and the Lateran, and his villa of Castel Gandolfo, are politically independent (*see* ROME). It is important to see article PAPACY for the Vatican State constituted in 1929.

In 1861 the law annihilating ecclesiastical jurisdiction and the privileges of the clergy was extended to the whole of the kingdom, and in 1866 a Bill was passed for the suppression (with certain exceptions) of religious houses throughout the kingdom.

Education. Elementary education is free and compulsory. For secondary instruction there are a large number of gymnasia and technical schools, and for the higher education there are no fewer than twenty-one State universities, many of them of ancient foundation, and at one time of considerable renown. The oldest are those of Bologna (founded in 1200), Padua (1222), Naples (1224), Genoa (1243), Siena (1300), Rome (1303), Pavia (1300), Pisa (1338), Turin (1404), and Parma (1502). There are in addition four free universities.

Money, Weights, and Measures. The present monetary system of Italy is the lira which is divided into 100 centesimi. The normal value of the lira is equal to about 9¼d. The weights and measures of Italy are on the metric system.

History. The ancient history of Italy will be found under ROME. The modern history begins with A.D. 476, when Odoacer, chief of the Herulians, a German tribe who had invaded the country, was proclaimed King of Italy. After a reign of twelve years he and his followers were overpowered by the Ostrogoths under Theodoric the Great. The Ostrogoths were in turn subdued by Byzantine troops, and Italy came under the dominion of the Eastern emperors, who ruled through an exarch residing at Ravenna.

In 568 the Lombards (Langobardi), a German people originally from the Elbe, led by their king, Alboin, conquered the Po basin, and founded a kingdom which had its capital at Pavia. The Kingdom of the Lombards included Upper Italy, Tuscany, and Umbria, with some outlying districts. But on the north-east coast the inhabitants of the lagoons still retained their independence, and in 697 elected their first doge, and founded the Republic of Venice (q.v.).

Ravenna, the seat of the exarch, with Romagna, Rimini, Ancona, and other maritime cities on the Adriatic, and almost all the coasts of Lower Italy, remained unconquered, together with Sicily and Rome. The slight dependence of this part of Italy on the court of Byzantium disappeared almost entirely in the beginning of the eighth century.

The power of the Pope, though at first recognized only as a kind of paternal authority of the bishop, grew steadily in these troubled times, especially in the struggle against the Lombard kings. In consideration of the aid expected against King Astolphus, Pope Stephen III (754) not only anointed the King of the Franks, Pepin, but appointed him Patrician or Governor of Rome. In return Pepin presented the exarchate of Ravenna, with the five maritime cities, to the Pope, thus laying the foundation of the temporal power of the Holy See.

At the invitation of Pope Hadrian I Charlemagne made war upon Desiderius, the King of the Lombards, took him prisoner in his capital, Pavia (774), and united his empire with the Frankish monarchy. Italy, with the exception of the Duchy of Benevento and the republics of Lower Italy, thus became a constituent part of the Frankish monarchy, and the imperial crown of the West was bestowed on Charlemagne (800).

On the breaking up of the Carlovingian Empire Italy became a separate kingdom, and the scene of strife between Teutonic invaders. At length Otto the Great was crowned emperor at Rome (961), and the year after became emporer of what was henceforth known as the Holy Roman Empire (q.v.).

During the following centuries the towns and districts of North and Middle Italy gradually made themselves independent of the empire, and either formed themselves into separate republics or fell under the power of princes bearing various titles. A large part of Middle Italy at the same time was under the dominion of the Popes, including the territory granted by Pepin, which was afterwards enlarged on several occasions. In Southern Italy there were in the time of Charlemagne several independent states.

In the ninth century this part of the peninsula, as well as Sicily, was overrun by Saracens, and in the eleventh century by Normans, who ultimately founded a kingdom which embraced

both Lower Italy and Sicily, and which, though it more than once changed masters, continued to exist as an undivided kingdom till 1282.

In that year Sicily freed herself from the oppression of the then rulers, the French, by the aid of Pedro of Aragon (*see* SICILIAN VESPERS), and remained separate till 1435. It was again separate from 1458 to 1504, when both divisions were united with the crown of Spain. With Spain the kingdom remained till 1713, when Naples and Sicily were divided by the Treaty of Utrecht, the former being given to Austria, the latter to the Duke of Savoy. In 1720 they were again united under Austria, but in 1734 were conquered from Austria and passed under the dominion of a separate dynasty belonging to the Spanish House of Bourbon (*See* SICILY; NAPLES).

The history of mediæval Italy is much taken up with the party quarrels of the Guelfs and Ghibellines, and the quarrels and rivalries of the free republics of Middle and Upper Italy. In Tuscany the party of the Guelfs formed themselves into a league for the maintenance of the national freedom under the leadership of Florence: only Pisa and Arezzo remained attached to the Ghibelline cause.

In Lombardy it was different, Milan, Novara, Lodi, Vercelli, Asti, and Cremona formed a Guelf confederacy, while the Ghibelline league comprised Verona, Mantua, Treviso, Parma, Placenza, Reggio, Modena, and Brescia. Commercial rivalry impelled the maritime republics to mutual wars. At Meloria the Genoese annihilated (1284) the navy of the Pisans and completed their dominion of the sea by a victory over the Venetians at Curzola (1298).

Up till the time of the Napoleonic wars Italy remained subject to foreign domination, or split up into separate republics and principalities. The different states were bandied to and fro, by the chances and intrigues of war and diplomacy, between Austria, Spain, and the House of Savoy.

During the career of Napoleon numerous changes took place in the map of Italy, and according to an Act of the Congress of Vienna in 1815 the country was parcelled out among the following states: (1) The Kingdom of Sardinia, consisting of the Island of Sardinia, Savoy, and Piedmont, to which the Genoese territory was now added; (2) Austria, which received the provinces of Lombardy and Venetia, these having already been acquired by her either before or during the time of Napoleon; (3) the Duchy of Modena; (4) the Duchy of Parma; (5) the Grand-Duchy of Tuscany; (6) the Duchy of Lucca; (7) the States of the Church; (8) the Kingdom of the Two Sicilies; (9) the Republic of San Marino; (10) the Principality of Monaco.

The desire for union and independence had long existed in the hearts of the Italian people, and the Governments at Naples, Rome, Lombardy, and other centres of tyranny were in continual conflict with secret political societies. The leading spirit in these agitations in the second quarter of the nineteenth century was Guiseppe Mazzini, who in the end contributed much to the liberation of his country.

The French Revolution of 1848 brought a crisis. The population of Lombardy, Venetia, Parma, and Modena took up arms and drove the Austrian troops in retreat to Verona. Charles Albert, King of Sardinia, then declared war against Austria, and was at first successful, but his forces were severely defeated at Novara (March, 1849), when Charles Albert abdicated in favour of his son Victor Emmanuel.

Meanwhile the Pope had been driven from Rome, and a Roman republic had been established under Mazzini and Garibaldi, the leader of the volunteer bands of Italian patriots. Rome was, however, captured by the French, who came to the aid of the Pope (July, 1849), who resumed his power in April, 1850, under the protection of the French, and the old absolutism was restored.

Similar attempts at revolution in Sicily and Naples were also crushed but the secret societies of the patriots continued their operations. In 1859, after the war of the French and Sardinians against Austria, the latter power was compelled to cede Lombardy to Sardinia, and in the same year Romagna, Modena, Parma, and Piacenza were annexed to that kingdom, which was, however, obliged to cede the provinces of Savoy and Nice to France.

In the south the Sicilians revolted and supported by a thousand volunteers, with whom Garibaldi sailed from Genoa to their aid, overthrew the Bourbon government in Sicily. Garibaldi was proclaimed dictator in the name of Victor Emmanuel. In August Garibaldi crossed to Naples defeated the royal army there, drove Francis II to Gaeta, and entered the capital on the 7th Sept. Sardinia intervened and completed the revolution, when Garibaldi, handing over his conquests to the royal troops retired to Caprera.

A plebiscite confirmed the union with Piedmont, and Victor Emmanuel was proclaimed King of Italy, thus suddenly united almost in Mazzini's phrase, "from the Alps to the sea. Only the province of Venice and the Roman territory still remained out

side. The former was won by Italy's alliance with Prussia in 1866 against Austria.

The temporal power of the Pope was still secured by French troops at Rome, till the French garrison was withdrawn at the outbreak of the Franco-German War in 1870, when Italian troops took possession of the city in name of King Victor Emmanuel. On 30th June, 1871, the seat of government was formally removed from Florence to Rome.

In 1878 Victor Emmanual died, and was succeeded by his son Humbert I. In 1900 Humbert was assassinated, and his son Victor Emmanuel III ascended the throne.

In 1882 Italy had joined Austria and Germany in the Triple Alliance, which was renewed in 1887, 1891, 1902, and 1912. A movement, however, was set on foot for the purpose of crushing German influence in the country, and of recovering the territories occupied by foreigners but Italian on account both of language and nationality. Such territories were chiefly the Trentino, and Trieste, or Istria (Italia Irredenta, or unredeemed Italy). In 1912 Italy obtained Tripoli and Cyrenaica from the Ottoman Empire.

In July, 1914, Austria delivered her ultimatum to Serbia, and the European War broke out, but as Italy had not been consulted by Austria, she considered herself freed from any obligation towards the two other members of the Triple Alliance and declared her neutrality.

The Irredentists, however, were at work, and their hopes of recovering Italia Irredenta grew daily. A strong interventionist party, urging the Government to join the Allies, was formed, and on 23rd May, 1915, the Italian Government under Salandra, who had succeeded Giolitti in Sept., 1914, declared war against Austria. Salandra, however, who had not conducted the war with sufficient vigour was succeeded by Boselli in June, 1916. His Cabinet included Sonnino and Orlando.

On the 27th Aug. war was declared on Germany by the Italian Government. In consequence of the disaster of Caporetto in 1917 a Cabinet crisis arose, and a new ministry was formed under Orlando as Premier. After the European War Italy received a considerable increase of territory, not only in Europe (for details *see* page 225) but also in East Africa (*see* JUBALAND).

The internal history of Italy in the period immediately succeeding the European War was marked by industrial and political disturbances of a very severe nature. Political disorders were complicated by industrial conflict; the peasants seized land; groups of workers seized factories in Milan and Northern Italy.

It was at this time that the Fascisti (*see* FASCISM) came into prominence ostensibly as an anti-Communist body. Under the leadership of Benito Mussolini the Fascisti organised in 1922 the march on Rome (*see* FASCISM) and the formation of a Government by Mussolini, who became virtually a dictator, and as such held complete control of the country. For the Vatican City and Lateran Treaty of 1929, *see* PAPACY.—BIBLIOGRAPHY: T. Hodgkin, *Italy and her Invaders*; A. H. Gifford, *New Italy*; E. Hutton, *Italy and the Italians*; Bolton King, *History of Italian Unity*; B. King and T. Okey, *Italy of To-day*; W. R. Thayer, *Dawn of Italian Independence*; C. L. Duff-Gordon, *Home Life in Italy*; J. Burckhardt, *The Civilization of the Renaissance*; J. A. Symonds, *The Renaissance in Italy*; T. N. Page, *Italy and the World War*; Helen Zimmern, *Italy and the Italians*.

Literature. The Italian language is one of the Romance tongues, or tongues derived from the Latin, and is therefore a sister of French, Spanish, and Portuguese. It is derived not from the literary language of Rome as we know it, but from the old popular dialect of *Lingua Romana rustica*. The invasions of the German races hastened the development of a new popular idiom, but the German languages exercised no essential influence on the grammatical structure of the new speech, although they contributed a number of words to its vocabulary.

The oldest monuments of Italian literature go little farther back than the beginning of the thirteenth century. The Latin language kept its place so long here in its natural home that the new popular speech was slow to develop; and in fact the earliest literary products of Italy are poems written in the Provençal and French languages. But about the close of the thirteenth century native poets arose, who indeed imitated the Provençals as to the form of their compositions, but wrote in their own language.

Among the most important of these early poets is the Florentine Guido Cavalcanti (died 1300), who contributed much to the development of Italian language and poetical style. But the great luminary of this period, and by far the greatest poetic genius which Italy has produced, was Dante (q.v.), 1265–1321.

In Italian prose the oldest book is Ristoro d'Arezzo's *Composizione del Mondo*, written about the middle of the thirteenth century. In this de-

partment Dante also takes a high place with his *Vita Nuova* and *Convito*.

Francesco Petrarca (Petrarch; 1304–74), another of the great lights of Italian literature, exhibits in his sonnets and canzoni a vein less profound and transcendental than Dante's, but more humanly tender and passionate.

Boccaccio (1313–75), a writer of great erudition and fertility, who produced classical translations, biographies, poems, &c., is Italy's first great story-teller. He is the master of the ornate classical style in prose to which he first gave high artistic form. His great work is the *Decamerone*, a collection of a hundred tales.

Amongst the other productions of the time are the historical works of Villani Capponi and Dino Compagni, the latter of doubtful authenticity, the travels of the Venetian Marco Polo, and the letters of St. Catherine of Siena. Amongst the comic poets of the time are Bindo Bonichi, Cecco Nuccoli, Andrea Orgagni, and Antonio Pucci.

During the fifteenth century the intellectual energy of Italy was almost entirely absorbed in the study of the ancient classics. This period is known as the Renaissance, or the revival of arts and letters. Italy had at this time become wealthy by commerce, and was enjoying comparative peace. Her cities were full of learned Greek refugees from Constantinople; many of her states were ruled by families such as those of the Medici at Florence the Este in Ferrara, the Gonzaga in Mantua, whose names are identified with the most munificent patronage of learning and art.

In the midst of this classical enthusiasm there was some danger of the national literature and language being neglected, but towards the end of the century Italian literature revived with the *Canti Carnascialeschi* and *Ballate* of Lorenzo de' Medici and Poliziano, the chivalrous epic *Orlando Innamorato* of Boiardo, the *Morgante Maggiore* of Luigi Pulci, and the *Mambriano* of Frecesco Bello (Cieco of Ferrara).

During the first half of the sixteenth century the Renaissance movement perfected itself in every kind of art. In history the most noted names are Machiavelli (1469–1527) and Francesco Guicciardini (1482–1540). Among the great poets of the period are Lodovico Ariosto (1474–1533), author of *Orlando Furioso*, a romantic epic, written in continuation of the *Orlando Innamorato* of Boiardo, and Torquato Tasso (1544–95), whose *Gerusalemme Liberata* is Italy's chief heroic poem.

Amongst the lyrists of this century we may mention Guidiccioni of Lucca, Pietro Bembo, Michelangelo Buonarroti, and Vittoria Colonna. Berni Cammelli and Grazzini deserve mention amongst humorous and burlesque writers, and Bandello amongst story-tellers. Better known, however, are Giorgio Vassari (1512–74), himself an eminent painter, but more celebrated as a delightful gossip on art and artists; Benvenuto Cellini (1500–70), the famous artist in metal, whose *Autobiography* is one of the most instructive lights on the spirit and manners of the age; and Giordano Bruno (1550–1600), a bold speculator and undaunted champion of liberty of thought.

In the period which followed, poetical and imaginative literature degenerated into mannerism and affectation. Of exceptional power was Allessandro Tassoni (1565–1635), who wrote the *Secchia Rapita*, a burlesque epic, and unquestionably the most important poetical production in Italian of the seventeenth century. Salvator Rosa, also, better known as a painter, wrote satirical verse of some merit.

But the most eminent names of this period are those of scientific and philosophic writers. Amongst the former are Galileo Galilei (1564–1642), Torricelli (1608–47), and Viviani (1622–1703); amongst the latter are Tommaso Campanella (1568–1639) and Giambattista Vico (1668–1744). Amongst historians the names of Sarpi, Davila, Bentivoglio, and Pietro Giannone deserve mention.

Towards the end of the century a new school of poetry arose, which was mainly a reaction against the existing turgid and affected style. The Academy of Arcadia was instituted (1690) to promote simplicity of style and the choice of simple pastoral subjects. The Arcadians produced no considerable poet, the chief names being Crescimbeni, Gravina, Frugoni, Zappi, and Rolli.

About the middle of the eighteenth century a complete revolution took place in Italian literature, which was preceded and accompanied by a general elevation of public life. The influence of English and German literature began to communicate a more healthy tone to the national literature. Gasparo Gozzi (1713–86) in the periodical *L'Osservatore*, and Giuseppe Baretti in a journal called the *Frusta Letteraria*, contributed perhaps more than any others, by their forcible and lively satire, to bring about this improvement.

In dramatic literature the libretti of Pietro Trapassi (1698–1782), better known by his assumed name of Metastasio, had considerable merit, though tending to over-refinement of sentiment and expression. In 1713 Scipione Maffei, celebrated also as an archæologist, produced the tragedy of *Merope*,

highly lauded at that time. But the two great names in the Italian drama are, in comedy, Carlo Goldoni (1707–93), and in tragedy, Vittorio Alfieri (1749–1803). Towards the end of the century the writings of the publicists Gaetano Filangieri and Cesare Beccaria indicate the growth of a social science under the cover of treatises on legislation and penal laws.

From the intellectual and political ferment which arose about the beginning of the nineteenth century Italy in particular received a much-needed stimulus. In poetry Ugo Foscolo (1776–1827), though following classical models and traditions, writes with the force and novelty of a new epoch. Vincenzo Monti (1754–1828) had a rich poetic vein and a facile talent. Alessandro Manzoni (1784–1873) has given Italy a few lyrics of the first rank, but the work which has most contributed to give him the high place he holds in literature is his novel *I Promessi Sposi*.

An equally high, if not a higher place, is due to the poetry of Leopardi. His prose is amongst the best that Italy has produced. Amongst the lesser though still notable names are Tommaso Grossi, Silvio Pellico, Giambattista Niccolini, a writer of dramas; Giovanni Berchet, a writer of songs and lyrics; and Giuseppe Giustè, the genial satirist.

The historico-political writings of Vincenzo Gioberti (1801–52) and Giuseppe Mazzini (1805–72) contributed powerfully to stimulate the national feeling and to shape the course of events. In history proper Amari (*I Vespri Siciliani*), Gino Capponi (*Republica di Firenze*), Ricotti, Zamboni, and others are the best-known names.

Amongst later and contemporary authors the two figures which stand out with permanent distinctness are Giosuè Carducci (1836–1907), poet, critic, and essayist, and Gabriele d'Annunzio (born in 1864), poet, novelist, and dramatist.

Other writers are Giovanni Prati (1815–84), Aleardo Aleardi (1812–78), Mario Rapisardi (1844–1911), Arturo Graf (1848–1913), Ada Negri (born in 1870), and Giovanni Pascoli (1851–1913), all poets of distinction. Giuseppe Giacosa (1847–1904) and E. A. Butti (1875–1910) are playwrights of distinction.

Of the Italian critics we shall mention Francesco de Sanctis (1818–86) Alessandro d'Ancona (1835–1914), and Benedetto Croce. Among other authors of note are: Ruggero Bonghi, a biographer and essayist of superior rank and a frequent contributor to the periodicals; Edmondo de Amicis (1846–1908), a descriptive writer; Angelo de Gubernatis, a writer of literary biographies, &c.; and Cesare Lombroso (1836–1908), who developed Italian criminology. Leaders of the futuristic movement in literature in the early twentieth century were Marinetti, Papini, and others. At the present time Benedetto Croce and Giovanni Gentile are outstanding in criticism and philosophy. A novel-writer of distinction is Grazia Deledda who was awarded the Nobel prize in 1927.

Mention must be made of Perandello, the dramatist and short-story writer, who has a European reputation.

—BIBLIOGRAPHY: A. Gaspary, *History of Early Italian Literature to the Death of Dante*; R. Garnett, *History of Italian Literature*; G. A. Greene, *Italian Lyrists of To-day*; L. Collison-Morley, *Modern Italian Literature*.

ITCH, known in medicine as *scabies*, is a disease of the skin due to a small insect, the acarus (*Sarcoptes scabiei*), just visible to the naked eye. The female insect is the cause of the disease, as she burrows under the epidermis and lays her eggs. The irritation produced gives rise to itching and also to the exudation of fluid in the form of vesicles on the surface of the skin. These may rupture and discharge fluid, or develop into pustules. When the irritation is long-standing the skin becomes much thickened.

The commonest parts of the body to be affected are the regions between the fingers, the wrists, the margins of the armpits, and the genital regions, but the condition, when untreated, may spread over most of the body surface. In children there is a greater tendency for the vesicles to become pustular and for complications to appear.

The patient's great complaint is itching, always most troublesome at night, and the most frequent complications to arise are impetigo and abscesses, and in long-continued cases, eczema.

In treatment the destruction of the acari is all that is necessary, and this done the patient will recover. Hot baths with thorough soaking, followed by vigorous rubbing and the application of sulphur ointment in some form should be the treatment on three successive days with a complete change of all underclothing on each occasion, and thorough disinfection of this clothing to avoid possible reinfection. This is satisfactorily carried out in the out-patient departments of hospitals, in school clinics, and, under supervision, in the homes of patients, and is effective in getting rid of the disease; but on active service in the army, with large numbers of men infected, when such means were not always possible, the disease proved much more resis-

tant, and led to considerable damage among the troops by the resulting complications.

ITCHEN, formerly an urban district, but since 1920 a suburb of Southampton, in Hampshire. It is situated at the mouth of the River Itchen, 1 mile east of Southampton.

ITCH-MITE (*Sarcoptes scabiei*), a minute animal of the class Arachnida, which produces itch in man. The female burrows in the skin, in which she deposits her eggs, that are hatched in about ten days, giving rise to this troublesome ailment.

ITH'ACA, now **THIAKI,** one of the Ionian Islands, on the west of Greece, between the mainland and Cephalonia, 17 miles long, and not above 4 miles broad. It is rugged and uneven, and divided into two nearly equal parts, connected by a narrow isthmus. The inhabitants are industrious agriculturists and mariners and build and fit out a considerable number of vessels. They seem to be of pure Greek race, and the women are famed for their beauty.

Ithaca was the royal seat of Ulysses, and is minutely described in the *Odyssey.* Schliemann made important excavations, and identified several sites mentioned by Homer. Ithaki or Vathi, the modern capital, trades largely in oil, wine, raisins, and currants, and has a population of about 7,000. That of the island is about 10,000.

ITHACA, a town of the United States, state of New York, about 1¼ miles south of the head of Cayuga Lake, the seat of Cornell University (q.v.). Pop. (1930), 20,708.

ITO, Hirobumi, Prince, Japanese statesman, born in 1838, died in 1909. In 1863 he came to London, and studied English life for over a year. From that time he played a great part in the rise of Japan. After holding posts in several Cabinets, in 1886 he became Prime Minister, a post which by 1901 he had held four times, resigning in that year. He paid several visits to Europe and the United States. In 1903 he was appointed President of the Privy Council; in 1905 Japan's first Resident-General in Korea, with the task of guiding that country in the way of reform. He was assassinated at Kharbin.

ITU, or **YTU,** a town of Brazil, in the state of Sao Paulo, on the Tiete. It is the centre of a coffee-growing district. Pop. 11,000.

ITURBIDE (ē-tur'bē-dā), **Augustin de,** a distinguished Spanish-American, born at Valladolid, in Mexico, in 1783, died in 1824. On the breaking out of the revolutionary troubles in Mexico he joined the Royalist party, and displayed such valour and ability that in 1815 he rose to the chief command of the army, but afterwards went over to the other side, quickly bore down all opposition, and became so popular that he proclaimed himself Emperor of Mexico in 1822. His reign was full of trouble, and came to an end in less than a year by his abdication. Congress granted him a yearly pension on condition of his leaving the country, and he resided in Leghorn about a year, when he made an attempt to recover the crown. He landed with but a single attendant, and was arrested and shot at Padilla on 19th July, 1824.

ITZEHOE (it'se-hō), a town of Germany, in Holstein, in a valley enclosed by wooded hills, on the Stör, 32 miles north-west of Hamburg. It is the oldest town in Holstein, being founded by Charlemagne in 809. In 1866 it passed from Denmark to Prussia. Pop. 19,637.

I'VAN, or **IWAN,** the name of several rulers distinguished in Russian history. —**Ivan III** (or I), Grand-Prince of Moscow, was born 1440, ascended the throne 1462, died 1505. He greatly enlarged his hereditary possessions, and married Sophia, niece of the last Byzantine Emperor, thus introducing the double-headed Byzantine eagle into the Russian coat of arms. He was the first to bear the title of Tsar of Great Russia, and proclaimed the unity and the indivisibility of the Russian dominions.

Ivan IV (or II), grandson of the former, was born 1530, succeeded in 1534, was crowned in 1547, died 1584. His atrocities gained him the name of *The Terrible.* Yet he did much to civilize and improve his people, introduced learned men, artists, and mechanics into Russia, and concluded a commercial treaty with England. He killed his eldest son in a fit of rage.—Cf. A. S. Rappoport, *History of Russia* (Temple Primers).

IVANGOROD, a fortified town of Poland, situated at the confluence of the Wieprz with the Vistula, about 60 miles south-east of Warsaw. The fortress of Ivangorod became prominent during the European War. It was attacked by Hindenburg in Oct., 1914, but the German attempt to capture the fortress during their first drive on Warsaw failed completely. Ivangorod was again attacked by the Austrians under Woyrsch in July, 1915. Defeated by the Austro-Hungarian troops under Kövess on 2nd Aug., 1915, the Russians evacuated the town on 4th Aug., and it was entered by Austrians on the following day.

IVANO'VO VOZNESENSK, a town of Soviet Russia, government of Vladi-

mir, an important centre of the Russian cotton manufacture. Pop. 162,300.

IVEAGH, Earl of, born Nov. 10, 1847, he was a son of Sir. B. L. Guinness, Bart., and was educated at Trinity College, Dublin. He entered the firm of Arthur Guinness, Sons & Co., and was for many years its chairman. In 1885 he was made a baronet, in 1891 a baron, in 1905 a viscount, and

Ivan the Terrible

n 1919 an earl. He died Oct. 7, 1927 being succeeded by his son. His wife ucceeded him as M.P. for Southend.

Lord Iveagh was known for his reat wealth and munificent charities. Ie established, in 1889, the Guinness rust, later known as the **Iveagh Trust,** or providing houses in Dublin and ondon, and gave large sums to hositals and the like. He left one of his eats, Ken Wood, Hampstead, and ome valuable pictures, to the nation.

IVIZA (ē'vi-sȧ; ancient **EBŪSUS**), n island of the Mediterranean belongng to Spain, 52 miles from Majorca, ne of the Balearic Islands; area, 230 q. miles; pop. 24,600. It is fertile, roducing corn, wine, oil, fruit, &c. Salt forms, with fish and wood, the chief export. The capital is of the same name, and has a good harbour. Pop. 7,000.

IVORY, the hard matter composing the tusks of the elephant, and the teeth or tusks of the hippopotamus, walrus, and narwhal. Ivory is esteemed for its beautiful white or cream colour, its hardness, the fineness of its grain, and its susceptibility of a high polish. That of the African elephant is most esteemed by the manufacturer for its density and whiteness. It is used as a material for knife-handles, pianoforte keys, &c.

The ivory of the hippopotamus is preferred by the dentist for making artificial teeth, being free from grain and much harder and of a purer white than that of the elephant. The shavings and saw-dust of ivory may be converted by burning into a black powder, used in painting, named *ivory black.*

Ivory may be stained or dyed; a black colour is given it by a solution of a copper salt and a decoction of logwood; a green one by a solution of verdigris; other colours by various synthetic dyestuffs. The use of ivory, chiefly for ornamental purposes, was well known in early ages. Among the Greeks it was employed for statuary purposes, &c. The medium weight of an elephant's tusk is 60 lb., but some are found weighing 170.

Ivory is an important article of African trade, and the number of elephants annually killed must be great; indeed, the extermination of this noble animal is only a question of time. Substitutes are afforded by bone, celluloid, *vegetable ivory* from the hard seeds of a South American palm (Phytelephas), and by *Galalith,* prepared from the casein of milk.

IVORY COAST (Côte d'Ivoire), a French colony constituting a part of French West Africa, and administered by a Lieutenant-Governor, who is under the authority of the Governor-General of West Africa. The colony is bounded west by Liberia, Sierra Leone, and French Guinea, and east by the Gold Coast, north by the French colony of Upper Senegal and Niger, and south by the Gulf of Guinea. On Jan. 1, 1933 part of Upper Volta was added. Its area is about 180,802 sq. miles, and its population (1931 census), 1,865,773. Europeans, 2,864; total pop. (1933), 3,743,382.

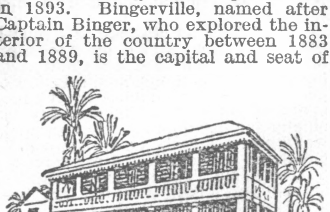
The coastal strip contains a number of lagoons which are navigable. On the borders of Liberia is a chain of hills, culminating in Mount Nimba (over 6,000 feet). The colony has vast and dense forests. The chief ports (mostly on lagoons) are: Grand Bas-

sam, Assinie, Grand Lahou, Sassandra, and Tabou. Other important centres in the interior are : Abidjan, Dimbokro, Bouaké, and Korhogo.

Maize, rice, and pineapples are cultivated by the natives, and coffee and cocoa trees by the Europeans. The colony exports palm-kernels, palm-oil, coffee, cocoa, rubber, and mahogany; its imports consist chiefly of tobacco, wines, and cotton goods.

The population consists of the Agnis, who are allied ethnographically to the Ashantis and are fetishists; the Mande group, comprising the Dioula and Senonfo, the former Mahommedans and the latter fetishists; and the Krumen, who are fetishists. There are about 4,000 Protestants and 3,000 Roman Catholics.

The Ivory Coast was occupied by the French in 1842, but the French possession really dates from 1889, and French authority became paramount in 1893. Bingerville, named after Captain Binger, who explored the interior of the country between 1883 and 1889, is the capital and seat of



Ivory Coast—Government House, Bingerville

administration which, however, will shortly be transferred to Abidjan.

Abidjan is an important inland place. A railway has been constructed from this place to Mangoloko (403 miles), and is to be lengthened to the north. There are five wireless stations. The Budget of the colony for 1931 was 111,643,600 francs.

IVORY-PALM (*Phytelĕphas macrocarpa*), a low-growing palm, native of the warmer parts of South America. It has a creeping caudex or trunk, terminal pinnatifid leaves of immense size, male and female flowers on different plants, and fruit in the form of a cluster of drupes, weighing about 25 lb. when ripe. Each drupe contains six to nine seeds, each as large as a hen's egg, the albumen of which when ripe is close-grained and very hard, resembling the finest ivory in texture and colour. It is therefore often wrought into buttons, knobs for doors or drawers, umbrella handles, and other articles, and is called *Vegetable Ivory*. The seeds are also known as *Corozonuts*, and are imported in considerable quantities.

IVREA (iv-rā'ȧ; the ancient **EPOREDIA**), a town of North Italy, province of Turin, picturesquely situated on the Dora Baltea, with a cathedral, said to have been founded in the fifth century on the site of a heathen temple. Pop. 12,000.

IVRY-LA-BATAILLE (iv-rē-lȧ-bȧtā-yē), a village in France, 40 miles west of Paris, where a battle was gained by Henry IV in 1590 over the forces of the League. Pop. 1,190.

IVRY-SUR-SEINE (iv-rē-sûr-sen), a suburb of Paris, on the Seine, 4 miles S.S.E. of the capital. It has a fine church, the remains of an old castle, asylum for lunatics, various manufactures, and extensive wine-cellars hewn out of the rock. Pop. 48,929.

IVY, a climbing plant of the genus Hedera (*H. Helix*), nat. ord. Araliaceæ. The leaves are smooth and shining, varying much in form, from oval entire to three and five lobed; and their perpetual verdure gives the plant a beautiful appearance. The flowers are greenish and inconspicuous, disposed in globose umbels, and are succeeded by deep green or almost blackish berries.

H. Helix (the common ivy) is found throughout almost the whole of Europe, and in many parts of Asia and Africa. It is plentiful in Britain, growing in hedges, woods, on old buildings, rocks, and trunks of trees. A variety, called the Irish ivy, is much cultivated on account of the large size of its foliage and its very rapid growth. The ivy attains a great age, and ultimately becomes several inches thick and capable of supporting its own stem. The wood is soft and porous, and when cut into very thin plates may be used for filtering liquids. In Switzerland and the south of Europe it is employed in making various useful articles.

The ivy has been celebrated from remote antiquity, and was held sacred in some countries, as Greece and Egypt. Its medicinal properties are unimportant. Chinese ivy (*Parechites Thunbergii*) is a climbing shrub with privet-like leaves and sweet-scented flowers.

IXI'ON, in Greek mythology, king of the Lapithæ in Thessaly. He sought to seduce Hera, and for his wickedness he was punished in Hades by being tied to a perpetually revolving fiery wheel.

IZHEVSK, capital of the Votyak area, Eastern Russia. Pop. 63,211.

IZMID, a town of Turkey in Asia Minor, Sea of Marmara, trading in silk and tobacco. Pop. 55,000.

J

J, the tenth letter in the English alphabet, and the seventh consonant. The sound of this letter coincides exactly with that of *g* in *genius*. It is therefore classed as a palatal, and is the voiced sound corresponding to the breathed sound *ch* (as in *church*). The sound does not occur in Old English, and was introduced through the French. As a character it was formerly used interchangeably with *i*, and the separation of these two letters in English dictionaries is of comparatively recent date.

JABALPUR (*ja-bal-pör'*), or **JUBBULPORE**, a town of India, capital of Jabalpur district, Central Provinces, a modern town with wide and regular streets, an important railway station and centre of trade, situated amidst rocks at an elevation of about 1,500 feet above the level of the sea. It has a school of industry, in which large quantities of tents and carpets are made. Pop. 134,862.—The district has an area of 18,950 sq miles, and a pop. of 2,296,508.

JAB'IRU (*Mycteria americana*), an American stork of white colour, with black head, neck, bill, and feet, which ranges from Texas to the Argentine.

JABLONEC. *See* GABLONZ.

JABLONITZA PASS, in the Transylvanian Carpathians. It was the scene of severe fighting during the European War, between Russians and Austrians, in 1915 and 1916, and between Rumanians and Austro-Germans in 1916 and 1917.

JABORAN'DI, a powerful drug obtained from the leaves and root of one or more plants of the genus Pilocarpus, ord. Rutaceæ, natives of Brazil. It causes a great increase of the saliva and profuse perspiration.

JACAMAR' (Galbula), brilliant tropical American birds allied to toucans and woodpeckers. Their plumage is of a metallic green above and reddish beneath; the long straight beak is generally black, as are also the weak feet. They live in damp woods and feed on insects.

JAC'ANA (Parra, &c.), the common name of birds of the family Parridæ, related to the plovers. They have long toes with very long claws, so that they can stand and walk on the leaves of aquatic plants when in search of their food, which consists of worms, small fishes, and insects. They inhabit lakes and marshes in tropical America, Africa south of the Sahara, South Asia, East Indies, New Guinea, and Australia.

JACARAN'DA, a name of several South American trees, nat. ord. Legu-

Jabiru

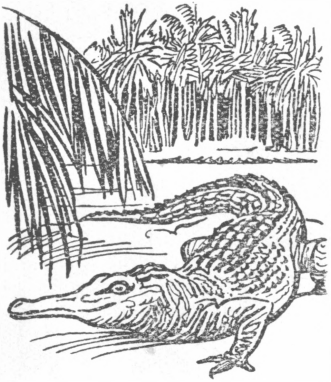
minosæ, yielding the fancy woods known as violet-wood, king-wood, and tiger-wood. A genus of Brazilian trees is also called *Jacaranda*, and some species of it yield rose-wood. It belongs to the nat. ord. Bignoniaceæ.

JACARE, an American crocodile of the genus Caiman. One species (*C. sclerops*) ranges from South Mexico to the Northern Argentine; two are native to Guiana; and two live in the Upper Amazon, one of these (*C. niger*) attaining the length of 20 feet.

JACK, from Fr. *Jacques*, James, which, being a very common personal name in France, came to stand for any common fellow or menial, and was substituted for the equally common English name John. Hence its application in such terms as *boot-jack*,

smoke-jack, *roasting-jack*, &c., and also in several senses alone. Thus a *jack* is an apparatus for raising great weights by the application of strong screws.

The flag called a *jack* is strictly one displayed from a jackstaff on the end of a bowsprit, but is now loosely used



Jacare

as in *Union Jack*. Taken nautically the term is applied to a bar of iron athwartships at a top-gallant mast-head, to support a royal mast and spread the royal shrouds.

JACK, or **JACA** (*Artocarpus integrifolia*), a tree of the bread-fruit genus, a native of India. The fruit, which springs from the old wood, grows to a larger size than the bread-fruit, often weighing more than 30 lb.; but it is neither so palatable nor so nutritious. It forms a great part of the food of the natives in some parts of India, Ceylon,

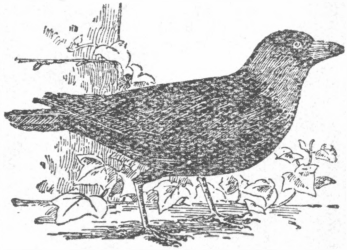
Slender Jackal (*Canis Anthus*)

&c. The timber is of a yellowish colour, and is used for many purposes.

JACK, a portable machine for raising weights to a small height, consisting of an endless screw working into a worm wheel, and turned by a handle or winch.

JAC'KAL, one of several species of the dog genus (Canis), native to Asia and Africa, and resembling small wolves in appearance. The general colour is a dirty yellow. Jackals are gregarious, hunting in packs, rarely attacking the larger quadrupeds. They feed chiefly on carrion, and are nocturnal in habits. Jackals interbreed with the common dog, and may be domesticated. One species (*C. aureus*) is common in India; and of the four African species one is the black-backed jackal (*C. mesomèlas*), and another (*C. adustus* or *lateralis*), distinguished by a dark side-stripe and a penetrating bark.

JACKDAW (*Corvus monedŭla*), a common British bird of the crow family, smaller than the rook, having a comparatively short bill and whitish eyes; hinder part of the head and neck of a greyish colour, back and wings glossy black. The average length is about 12 inches. The nests are built in towers, spires, or like elevated situations, hollow trees, and holes in cliffs. The eggs, from five to six, are of a greenish colour. Its food consists of worms, insects, and larvæ.



Jackdaw (*Corvus Monedŭla*)

Like their neighbours the rooks, they are gregarious. They are readily domesticated, and may be taught to pronounce words distinctly. Like the magpies, they have attained a notoriety for thieving.

JACKSON, Andrew, seventh President of the United States from 1829 to 1837, was born in South Carolina 15th March, 1767, died 8th June, 1845. His father, who was of Scottish descent, had died before his son's birth. In his fourteenth year, on the outbreak of the American Revolution, he joined a regiment of volunteers to fight in the cause of independence. After losing two brothers in the struggle, he retired from military service and devoted himself to law. He became a judge of the Supreme Court, representative of Tennessee in Congress, and Senator. When, in 1812, war was declared

against England, he was made major-general of the Tennessee militia.

In 1813 he defeated the Creek Indians, who were wasting the country with fire and sword, and made himself master of Pensacola. While engaged in the defence of New Orleans, he established his military reputation by his repulse of the British there in 1815. His arbitrary proceedings, however, incurred general censure, and he was condemned to pay a heavy fine.

From 1817 to 1818 he was employed against the Seminole Indians, but again acquired a reputation for excessive severity. In 1828 and again in 1832 he was elected President, and the eight years during which he held this office were marked by the rapid extension of democratic tendencies. In 1837 he retired to his estate in Tennessee, and there he died.—Cf. T. E. Watson, *Life and Times of Andrew Jackson*.

JACKSON, Sir Barry Vincent, English actor manager. Born in Birmingham, Sept. 6, 1879, he founded a company of players in 1907. In 1913 he started the Birmingham Repertory Co., to the direction of which he returned after serving in the navy during the Great War. In 1925 he was knighted. Among his productions are *Abraham Lincoln*, *The Immortal Hour*, *Back to Methuselah*, *The Apple Cart*, and several Shakespearean plays in modern dress.

JACKSON, Sir Francis Stanley, English politician and cricketer. Born Nov. 22, 1870, he captained the Cambridge eleven in 1893, and for many years played for Yorkshire. In 1905 he was captain of England in the test matches against Australia, and he played for the Gentlemen and in other representative matches, proving himself one of the greatest all-round cricketers of his age. Jackson served in the Boer War and during the Great War commanded a battalion. In 1915 he was elected Unionist M.P. for Howdenshire, and in 1922 he was made Financial Secretary to the War Office. In 1923 he became chairman of the Unionist organization, and in 1927 Governor of Bengal, relinquishing the latter office in 1932.

JACKSON, Frederick George, British Arctic explorer, born in 1860. Educated in Edinburgh University, he travelled in the Australian deserts, and in 1893 made a sledge journey of about 3,000 miles across the Siberian tundra and Lapland in midwinter. In 1894 he commanded the expedition sent out by Lord Northcliffe (then Alfred Harmsworth) to explore Franz-Josef Land. He made journeys in remote parts of Central Africa in 1925–26.

JACKSON, Henry, regius professor of Greek at Cambridge 1906–21, was born in 1839, and died in Sept., 1921. He was educated at Cheltenham College and at Trinity College, Cambridge, where he graduated as third in the Classical Tripos of 1862, the year in which Jebb was senior classic. He became assistant tutor of his college in 1866, and was prælector in ancient philosophy from 1875 to 1906, when he succeeded Jebb in the Greek chair. He was awarded the Order of Merit in 1908, and received honorary degrees from the Universities of St. Andrews, Aberdeen, Glasgow, Oxford, Manchester, and Sheffield.

While he was a profound scholar in every branch of classical learning, Professor Jackson made a special study of Greek philosophy, and wrote many papers in the *Journal of Philology* and elsewhere on philosophical subjects. He edited the Fifth Book of Aristotle's *Ethics*, and published, in conjunction with R. C. Jebb and W. E. Currey, a collection of *Translations*. He was a keen Dickensian and in 1911 discussed the problems connected with Dickens's unfinished novel in a small book entitled *About Edwin Drood*.

JACKSON, Sir Thomas Graham, English architect. Born in London, Dec. 21, 1835, during a long professional career, he designed buildings for several colleges at Oxford and Cambridge, and for some public schools, including Harrow and Winchester. His restoration work included Winchester Cathedral, and the great churches at Bath, Malvern, and Christchurch. Jackson was elected A.R.A. in 1892 and R.A. in 1896. In 1913 he was made a baronet, and he died Nov. 7, 1924. He wrote several books on Gothic architecture.

JACKSON, Thomas Jonathan, better known as *Stonewall Jackson*, an American general, born in 1824 in Virginia, died 9th May, 1863. In 1842 he entered the military academy at West Point as cadet. Four years later he received a second-lieutenant's commission, and was engaged in the Mexican War, and for his gallantry was made a captain, and afterwards raised to the rank of major. In 1852 he resigned his commission, and was appointed professor of mathematics and artillery tactics in the military institute at Lexington, Virginia. On the outbreak of the Civil War in 1861 he entered the Southern army with the rank of brigadier-general. He commanded the reserve at Bull's Run, and acquired his cognomen of 'Stonewall' by the firmness of his troops and his own coolness in the heat of action. By the end of the year he was made major-general. In June, 1862, he

was defeated by General Banks at Cross Keys, but made a masterly retreat.

In August, 1862, he won the second battle of Bull's Run, and captured Harper's Ferry in September. In the same month he supported Lee at Antietam, and again at Fredericksburg in December. In 1863 he took a prominent part in the battle of Chancellorsville. On the evening of the battle he died of wounds inadvertently received from his own men. He was a man of indomitable energy and deep religious feeling.—BIBLIOGRAPHY: H. A. White, *Stonewall Jackson*; J. E. Cooke, *Stonewall Jackson*; *a Military Biography*.

Stonewall Jackson

JACKSON, a city of Michigan, United States, 76 miles west of Detroit, an important railway centre, with coal-mines, foundries, engine-works, various manufactures, and the State prison. It was settled in 1829, and became a city in 1857. Pop. (1930), 55,187.

JACKSON, the capital of Mississippi, United States, on the Pearl River, 45 miles east of Vicksburg, with a handsome State house. It was settled in 1830, and became a city in 1840. Pop. (1930), 48,282.

JACKSON, a town of Tennessee, United States, with a Baptist university and trade in cotton. It was settled in 1819, and became a city in 1854. Pop. (1930), 22,172.

JACKSONVILLE, a town of Illinois, United States, on a fertile prairie, near a small affluent of the Illinois River. It has some handsome public buildings, and various educational and charitable institutions, including the Illinois College, and State asylums for the blind, insane, and deaf and dumb. It was settled in 1825, and became a city in 1867. Pop. (1930), 17,747.

JACKSONVILLE, a town of Florida, United States, the principal port on the River St. John, 25 miles from its mouth, with an active steamboat traffic and a large trade in lumber and cotton. Pop. (1930), 129,549.

JACK THE RIPPER, the name given to an unknown criminal who perpetrated a series of brutal murders on unfortunate women in the East End of London between Dec., 1887, and July, 1889. Most of the women were mutilated in such a way that the authorities were of opinion that the murderer was probably a sexual maniac. Jack the Ripper was never caught or even identified by the police.

JACOB, the son of Isaac, and the grandson of Abraham, the last of the Jewish patriarchs, and the true ancestor of the Jews. Having craftily obtained from the blind and infirm Isaac the blessing of the first-born in place of his brother Esau, he was obliged to flee from the anger of his brother, and took up his abode with his uncle Laban. Here he served twenty years, and obtained Leah and Rachel as his wives.

On his return to Canaan he was met by an angel, with whom he wrestled all night, and having gained the victory was thereafter named *Israel*, that is, *the hero of God*. Hence the Hebrews from him are called *Israelites*. A severe blow to him in his old age was the loss of his favourite son Joseph, whose brothers had sold him to Ishmaelite merchants, and led Jacob to believe that he had been devoured by wild beasts.

Joseph subsequently became the highest officer at the court of Pharaoh in Egypt, and thus was the means of bringing the whole House of his father to that country. Jacob died at the age of 147, and, according to his wish, was buried in the tomb of Abraham, before Mamre in Canaan.

JACOBI (yä-kō'bi), **Friedrich Heinrich,** a German philosopher, born 1743, died 1819. He first engaged in commerce, but retired from business on receiving a public appointment. He formed acquaintance with many of the most eminent literary men of the day, including Goethe, Wieland, and Herder. Afterwards he was made president of the Bavarian Academy at Munich, retiring in 1813.

His views had some analogies with those of Hamilton and the Scottish school. Thought, he affirms, cannot explain facts but only connect them. The existence of objects that affect us cannot be demonstrated, but we are directly convinced of their existence in the act of perception. The knowledge of God is present to us through the heart in virtue of the divine spirit within us, which comes directly from God.

His most noted works are the philosophic novels *Allwills Briefsammlung* and *Woldemar*; a work on the doctrine of Spinoza, *Briefe über die Lehre Spinozas*; and *David Hume über den Glauben, oder Idealismus und Realismus*.—Cf. Lévy-Bruhl, *La Philosophie de Jacobi*.

JACOBI, Karl Gustav Jacob, one of the great mathematicians of the nineteenth century, born at Potsdam of Jewish parents in 1804, died in 1851. He was professor at Königsberg from 1829 to 1842. After ill-health had compelled him to retire, he was granted a royal pension, and spent his last years at Berlin. His chief work was done on elliptic functions, the theory of which had been founded by Abel and Legendre, but owes more to Jacobi than to any other mathematician.

The treatise, *Fundamenta nova theoriæ functionum ellipticarum* (1829), in which he develops the theory of the Theta functions, is a classic. He was a prolific writer, and left his mark on nearly all departments of mathematical analysis. The Berlin Academy published his *Gesämmelte Werke* (1881–91).

JAC'OBINS, the most famous of the clubs of the great French Revolution. It originated as a club of Breton deputies at the meeting of the States-General at Versailles in 1789, and, when the National Assembly removed to Paris in 1790, it took up its quarters in the Dominican Convent, which was commonly known as the Jacobin Convent from its dedication to St. James. Its membership then ceased to be purely Breton and to be confined to men who sat in the Assembly, and it became the most prominent revolutionary debating society. It consisted, from the first, chiefly of advanced politicians, but so moderate a man as Mirabeau was its president in the end of 1790.

About the time of the dissolution of the National Assembly (Sept., 1791), Robespierre became the leader of the Société des Amis de la Constitution (as the Jacobin Club was technically described), and, under his guidance, it exercised an illegitimate influence over the elections to the Legislative Assembly. In that body the Jacobins were in a minority, but they dominated its counsels, and the club was in some respects more important than the Assembly. It had over 1,200 branches in various parts of France, all of which recognized the authority of the headquarters in Paris, and its opinions were spread by the publication of a *Journal*.

The insurrectionary movements of 20th June and 10th Aug., 1792, were largely inspired by Jacobin dissatisfaction with the existing Constitution, and the official name of the club was changed to Société des Amis de la Liberté et de l'Égalité. The Jacobins also obtained control of the Commune or municipal council of Paris which encouraged the massacres of Sept., 1792. When the Convention came into power in the autumn of 1792, the dominant section of the Jacobin Club entered into a long struggle with the more moderate section of Girondists, many of whom were members of the club but were expelled at an early stage in the conflict.

To the growing Jacobin influence may be attributed, in part, the execution of Louis XVI in Jan., 1793, and in the following summer the Girondists were definitely defeated. From that time the Jacobin leader, Robespierre, had the chief power in the Committee of Public Safety, the new form of the revolutionary government, and the club and the Commune were responsible for the Reign of Terror. Robespierre's authority depended largely upon the support of the club, which took a prominent part in the contest against the attempt of Hébert and the Commune to introduce compulsory atheism, and in the establishment of the Festivals of the Supreme Being.

After Robespierre's fall in July, 1794, the Jacobins were naturally regarded as his accomplices, and there was a demand for vengeance upon them as the chief agents in the Terror. The club was therefore suppressed in Dec., 1794. An unsuccessful attempt to resuscitate it was made in 1799. The word 'Jacobin' became an English term for the advocates of extreme or revolutionary views, and Canning gave the title of the *Anti-Jacobin* to his periodical satire on French republican theories. The word Jacobin has recently tended to be replaced by Bolshevik as a name for extreme revolutionaries.—Cf. F. A. Aulard, *La Société des Jacobins, Recueil de Documents*.

JAC'OBITES, Monophysite Christians in the East, who were united by a Syrian monk, Jacobus Bardai (578), during the reign of

Justinian, into a distinct religious sect. The Jacobites, so styled from their founder, now number about 80,000, and their Church includes the three patriarchates of Antioch, Alexandria, and Armenia. Circumcision before baptism and the doctrine of the single nature of Christ (hence their name *Monophysites*) are common to them with the Copts and Abyssinians; but in other respects they deviate less than the other Monophysites from the discipline and liturgy of the orthodox Greek Church. *See* NESTORIANS.—Cf. F. J. Bliss, *The Religions of Modern Syria and Palestine*.

JACOBITES (from the Lat. *Jacōbus*, James) was the name given at the Revolution of 1688–9 to the party which wished to replace King James II and VII on the throne. In the reign of William III they made attempts at a restoration both in Scotland and in Ireland, but the Scottish effort failed after the death of Viscount Dundee (Graham of Claverhouse) at the battle of Killiecrankie in 1689, and the Irish Jacobites were suppressed after the battle of the Boyne in 1690.

During the rest of the reign of William, and throughout that of Anne, the Jacobites were content with plots and conspiracies, and their hopes were raised by the accession of the Tories, under Oxford and Bolingbroke, to power at the end of Anne's reign. The queen was known to have sympathy with her half-brother, the unfortunate prince who was described by the Jacobites as James III and VIII, and by others as the Chevalier de St. George or the Pretender, and Bolingbroke was corresponding with him. But the Tories were timorous and half-hearted; the queen's death took them by surprise, and they missed the best opportunity which ever occurred for the Jacobite cause.

The new king, George I, was unpopular, and in 1715, a year after his accession, the Jacobites took the field. They had a large following in Scotland and some support in the north of England, but they were deceived in their hopes of French help, and their leader the Earl of Mar, was incompetent, James himself did not arrive until Mar had been defeated at Sheriffmuir, near Dunblane, and the English Jacobites at Preston, in November, and he had to make his way back to France. Some years later, when the Government of George I was involved in quarrels with Spain and with Sweden, a project of a second rising failed through the death of Charles XII of Sweden, and there was only an insignificant Spanish invasion at Glenshiel (1719).

When the Jacobites at last found a real leader in the person of Prince Charles Edward, the elder son of the Chevalier de St. George, their chance of success had been destroyed by the long period of peace and prosperity which the country had enjoyed under the rule of Walpole. French help again failed, and the prince landed, with only seven followers, near Arisaig in July, 1745. A large number of Highlanders flocked to his standard, and he made a march upon Edinburgh, which capitulated, and the prince defeated the Government troops under Cope at Prestonpans. An invasion of England followed, but on reaching Derby, in December, a council of war, against the wishes of the prince, decided upon a retreat in view of the almost entire lack of English support.

The Jacobites won another victory at Falkirk in Jan., 1746, but were completely defeated by the Duke of Cumberland at Culloden, near Inverness, on 16th April, and the prince, after many narrow escapes, made his way to France in September.

The suppression of the '*Forty-five* marks an era in the history of Scotland, and especially in the history of the Highlands, which were for the first time brought under the control of the central Government. It also marks the end of the Jacobites as a political party.

Although a sentimental Jacobitism continued to exist until the death of the prince's brother, the Cardinal Duke of York, in 1807, it ceased to have any actual significance, and the Tories avowed their loyalty when George III succeeded in 1760. Most of the beautiful Jacobite songs were written after Jacobitism had ceased to be a political force, and many of them were the work of Lady Nairne, a bigoted Presbyterian.—BIBLIOGRAPHY: F. W. Head, *The Fallen Stuarts*; H. M. Vaughan, *The Last of the Royal Stuarts*; James Hogg, *The Jacobite Relics of Scotland*; A. Lang, *The King over the Water*, and *Prince Charles Edward*.

JACOBS, William Wymark, English writer. Born in London, 8th Sept., 1863, he was for many years a clerk in the Post Office. He soon began to write short stories and made his name with a volume called *Many Cargoes*, 1896, followed by *Light Freights*, *Captains All*, *Ship's Company*, *Night Watches*, *Deep Waters*, and in 1926, *Sea Whispers*. He wrote longer stories in the same vein, *The Skipper's Wooing*, *Dialstone Lane*, *Salthaven* and *At Sunwich Port*. The stories deal mainly with the humorous adventures of seamen and bargemen. Jacobs has also shown himself a master of the occult type of story, and *The Monkey's*

Paw and others are masterpieces of their kind.

JACOBSEN, Jens Peter, Danish author, born at Thisted, in Jutland, 7th April, 1847, died 30th April, 1885. He studied botany at the University of Copenhagen, and became known as the translator of Darwin. In 1872 he was awarded the gold medal of the university. Jacobsen, however, was interested in letters as well as in science, and in 1872 he published his first volume of stories, entitled *Mogens.*

This was followed by his historical novel *Marie Grubbe,* a study of seventeenth-century life; *Niels Lynne* (English translation under the title of *Siren Voices*), a modern novel with sceptical and realistic tendencies. What distinguishes Jacobsen's novels is the mixture of imagination, science, and philosophy. His prose style is now considered as one of the best in Denmark.

JACOB'S LADDER (*Polemonium cæruleum*), a plant of the ord. Polemoniaceæ, an ornamental border-plant, of easy culture and propagation; indigenous to Central and Southern Europe, and parts of Asia and North America.

JACOB'S LADDER, in nautical sense a rope ladder with wooden rungs, used by pilots.

JACQUARD (zhăk-ăr), **Joseph Marie,** the inventor of the famous machine for figured weaving named after him, was born at Lyons in 1752, died in 1834. His parents were silk weavers, and he learned the same trade. After a long period of hardship, during which he shared in some of the campaigns of the Revolution, he made his name famous by the invention of his new loom, which was publicly exhibited in 1801.

He endeavoured to introduce it into general use in Lyons, but was mobbed, and all but lost his life. Ultimately, however, his invention was bought by the French Government, and he was able to spend the latter part of his life in comfortable independence. The subsequent prosperity of Lyons is largely attributable to his invention, and in 1840 a statue was erected to him on the very spot where his loom was publicly destroyed.

JACQUARD LOOM, a name given to any ordinary kind of loom on the top of which a machine termed a 'jacquard' is fitted. The name given to such a loom is due to the fact that Joseph Marie Jacquard invented the cylinder, and arranged this, in conjunction with existing parts of a somewhat similar pattern-producing machine, in the positions which they are used to this day.

The combination of the jacquard and loom with the jacquard cards punched or perforated to form, in conjunction with the needles and hooks of the jacquard, the selecting medium of the ornament, enables all kinds of decorative fabrics to be produced in the so-called jacquard loom. Such a machine is used essentially and exclusively for the ornamentation of fabrics in which the pattern on the cloth is developed by a very large number of different ways of interweaving the weft with the warp; it may, however, be also used as a figuring device in conjunction with several different colours of warp and weft yarns, in which case the fabrics produced may be tapestries, brocades, carpets, velvets, hangings, and a host of others.

Decorative fabrics such as Axminster carpets and tapestry carpets do not require a jacquard for their production. *See* WEAVING.

JACQUERIE (zhăk-rē), the name given to the rising of the French peasantry against their lords in the middle of the fourteenth century, after the battle of Poitiers. They committed great devastations and outrages, particularly in the north-east of France. They were at length quelled by Captal de Buch and Gaston Phébus, Count of Foix. The term *Jacquerie* is derived from *Jacques Bonhomme,* a familiar epithet for the French peasant.

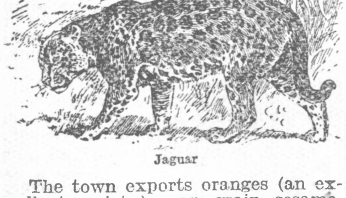
JADE, or **JAHDE** (yä'de), a small strip of coast territory belonging to the Prussian province of Hanover, but locally in Oldenburg, at the entrance of Jade Bay. It was acquired by the Prussian Government for the purpose of constructing a naval port and shipyard, and here has grown up Wilhelmshaven.

JADE, an ornamental stone, also called nephrite, a native silicate of calcium and magnesium. It is a matted aggregate of crystals of a non-aluminous or slightly aluminous amphibole (*see* HORNBLENDE), usually of a colour more or less green, of a resinous or oily aspect, and, when polished, hard and very tenacious. It has long been highly prized for making carved ornaments in China, New Zealand, and among the native races of Mexico and Peru.

Jade celts or axes are common among uncivilized races, and prehistoric specimens have been found in Europe, though the stone itself is not found there. A similar stone, more properly called *jadeite,* is frequently confounded with jade proper. It is a silicate of aluminium and sodium. Being hard, it is used in China and elsewhere for the same purposes as jade.

JAEN (*hä-en'*), a picturesque town of Southern Spain, Andalusia, capital of the province of Jaen, 41 miles N. by W. of Granada. It is the seat of a bishop, and has an imposing cathedral in the Renaissance style, episcopal seminary. Pop. (1931), 40,421. —The province of Jaen was a Moorish kingdom till 1246, and fell under the sway of Castile. Area, 5,203 sq. miles; pop. (1931), 682,626.

JAFFA (anciently **JOPPA**), a seaport of Palestine, 31 miles north-west of Jerusalem, picturesquely situated upon an eminence, the port of Nablus and Jerusalem, with which latter it is now connected by railway. The town was taken by Napoleon in 1799, and during the European War it was captured by the British under Allenby on 17th Nov., 1917. It was occupied by Australian and New Zealand troops. Disturbances and encounters between Jews and Arabs took place at Jaffa in 1921.



Jaguar

The town exports oranges (an excellent variety), soap, grain, sesame, and olive-oil. A railway line connecting Ludd with Jaffa was opened in 1920. Pop. (1931), 51,366.

JAFFNA, or **JAFNAPATAM**, a town of Ceylon, at the northern extremity of the island, originally a Dutch settlement, and still thoroughly Dutch in its architecture and aspect. Most of the inhabitants are Tamils. Pop. 42,436.

JÄGERNDORF (*yā'gĕrn-dorf*), now **KRNOV**, a town of Czechoslovakia (formerly in Austria, Silesia), on the Oppa, 13 miles north-west of Troppau. It is walled, has a handsome church, a palace, and manufactures of woollens. Pop. (1930), 23,465.

JAGOW, Gottlieb von, German statesman, born 22nd June, 1863. Educated at the University of Bonn, he was in the diplomatic service and became Ambassador at Rome in 1909, retaining his post until 1913. He was subsequently appointed Secretary of State for Foreign Affairs, but retired in Nov., 1916, when Germany's peace offer to the Allies had failed. He published *Causes of the World War*.

JAGUAR (*ja-gwär'*), *Felis onca*, the American tiger, an arboreal carnivorous mammal of South and Central America, sometimes equalling a leopard in size, of a yellowish or fawn colour, marked with large dark spots and rings, the latter with a dark spot in the centre of each. It rarely attacks man unless hard pressed by hunger or driven to bay. The skin is valuable, and the animal is hunted by the South Americans in various ways.

JAINAS, or **JAINS**, a Hindu religious sect which, from the wealth and influence of its members, forms an important division of the Indian population. The sect was very numerous and important in the eighth and ninth centuries of the Christian era, and they have left many monuments of their skill and power in the fine temples built in different parts of the country. Jainism, like Buddhism, denies the authority of the Veda, and is therefore heretical, according to the Brahmans. It goes back to those early currents of Indian religious speculations which gave rise to the Indian philosophies and to Buddhism.

Jainism is not an offshoot of Buddhism, and although it has many doctrines in common with Buddhism, it is distinguished from the latter by its recognition of a divine personal ruler of all, and by its political leanings towards Brahmanism. The Jains reverence certain holy mortals, who have acquired by self-denial and mortification a station superior to that of the gods; and they manifest extreme tenderness for animal life.—Cf. H. L. Jhaveri, *The First Principles of the Jain Philosophy*.

JAIPUR (*jī-pŏr'*), or **JEYPORE**, a state in Rajputána, India, governed by a maharajah, under the political superintendence of the Jaipur Residency; area, about 15,579 sq. miles. The soil, except in the south-east, is mostly sandy; the surface of the country is diversified by hill ranges. Corn, cotton, tobacco, opium, and sugar-cane are extensively raised. There are manufactures of enamel work on gold and of woollen cloth. Pop. 2,631,775.

JAIPUR, capital of the above state, one of the finest of modern Indian cities, has regular streets, with large, handsome houses. It was founded in 1728. There is a college, a school of arts, an industrial museum, a hospital, fine gardens, and several beautiful temples. Pop. 144,179.

JAISALMER (*jī-sal-mär'*), or **JEYSULMEER**, a state of India, in Rajputána, under the political superintendence of the Western States Agency; area, 16,062 sq. miles. It is

mostly a sandy desert with sparsely scattered villages. Water is scarce, the wells going down to a depth of 490 feet. The climate is healthy. Pop. (reduced by famine), 76,255.

JAISALMER, the capital of the above state, is situated on a rocky ridge. The palace, the Jain temples in the fort, and the houses of the wealthy have exquisite stone-carving. Pop. 8,000.

JAJPUR, or **JAJPORE,** a town of India, on the Baitarani, in Cuttack district, Bengal. It is considered sacred by the Brahmans. Pop. 11,283.

JAKOBSTAD, a seaport of Finland, 250 miles north of Helsingfors. Pop. 8,000.

JALALABAD. *See* JELALABAD.

JALAL'PUR, a town of India, in Gujerat district, Punjab, with a Government school, and shawl manufactures. Pop. 11,015.

JALANDHAR (*jal-an-dhar'*), or **JULLUNDUR,** a town of India, headquarters of district of same name, in the Punjab; with a good trade, military cantonment, excellent American Presbyterian mission school, &c. Pop. 71,008.—The district, a fertile tract between the Sutlej and the Beas, has an area of 1,433 sq. miles, and a pop. of 918,000.

JALAP, *Ipomœa Purga,* a Convolvulaceous climber of the Mexican Andes. The tuberous roots contain two glucosidal resins, jalapine and scammonine; the latter also occurs in scammony (*Convolvulus Scammonia*) and in *Ipomœa orizabensis,* both of which are drastic purgatives.

JALAPA, or **XALAPA** (*hȧ-lȧ'pȧ*), a city, Mexico, capital of the state of Vera Cruz. It is the residence of the wealthiest merchants of Vera Cruz, and enjoys a fine climate. The *jalap* root is found abundantly there. Pop. 24,816.

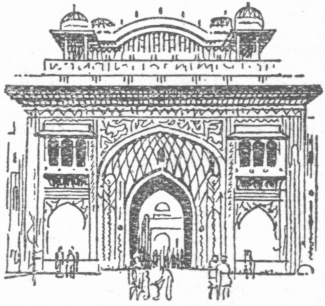
JALA'UN, a town in a district of the same name in the United Provinces of India, 110 miles S.E. of Agra, in a swampy and unhealthy locality. Pop. 8,300.—The district consists of a plain west of the Jumna; area, 1,469 sq. miles; pop. 405,000.

JALISCO (*hȧ-lis'kō*), or **GUADALAJARA,** a state of the Republic of Mexico, bounded on the west by the Pacific. It is chiefly mountainous, but well watered and wooded, and the climate is healthy. The soil is fertile, and wheat and barley are abundantly produced. The capital is Guadalajara. Area, 33,492 sq. miles; pop. 1,239,484.

JALPAIGURI (*jal-pī-gu-rē'*), a town of India, head-quarters of district of same name, in Bengal, on the Teesta; pop. 15,000.—The district lies south of Bhutan and north of Kuch Behar; area, 2,960 sq. miles; pop. 936,269.

JAMAICA, the largest of the British West India Islands; area, 4,450 sq. miles. Attached to Jamaica are the Cayman Islands (q.v.), the Turks and Caicos Islands (q.v.), and Morant and Pedro Cays, which have a total additional area of 224 sq. miles. It is divided politically into three counties—Cornwall, Middlesex, and Surrey; its capital is Kingston.

Physical. The island as a whole is very beautiful, and much of it is fertile. The coast is indented with a number of good harbours, of which Port Royal or the harbour of Kingston is the most considerable. The interior is traversed by lofty mountains in all directions, the principal chain, called



City Gate at Jaipur

the Blue Mountains, reaching the height of 7,420 feet. The declivities are steep, and covered with stately forests. Jamaica is well watered, having numerous rivers and springs. Earthquakes of a violent character have been frequent.

Climate. The climate in the districts along the coast is, in most places, exceedingly hot, but is not on the whole unhealthy; on the high lands the air is temperate and pure, while even on the low grounds the heat is greatly moderated by the cool sea-breezes which set in every morning. There are two rainy and two dry seasons. Among the indigenous forest trees are mahogany, lignum-vitæ, iron-wood, logwood, braziletto, &c.

Production. The native fruits are numerous, and many of them delicious; they include the plantain, guava, custard-apple, pineapple, sour-sop, sweet-sop, papaw, and cashew-apple. The orange, lime, lemon, mango, grape, bread-fruit tree, and cinnamon tree have all been naturalized in the island. The chief cultivated vegetable products are sugar, coffee, maize, pimento,

bananas and other fruits, ginger, and arrow-root. The cinchona tree has been introduced, and is spreading. Of wild animals only the agouti and monkey are numerous. Domestic fowls thrive well, and cattle-raising is profitable. Fish abound in the sea and rivers.

Finance, Commerce, &c. The exports and imports for 1931–2 had a value of £3,420,750 and £4,945,339 respectively. Fruit, sugar, rum, coffee, dye-woods, and pimento are the chief of the former, and clothing and other manufactured goods of the latter. The revenue amounts to over £2,000,000 annually; the public debt is £5,305,770, the greater part of it having been expended on railways, roads, harbours, and other public works. Spanish Town and Kingston are united by railway, and the total number of miles open for traffic is about 210.

Government. The government is vested in the Governor, assisted by a Privy-Council and a Legislative Council composed of twenty-nine members, fourteen elected, ten nominated, and five *ex officio*; women were enfranchised in 1919.

Religion and Education. The English Church is presided over by a bishop, assisted by a regular staff of parochial clergy. The Baptists, Methodists, Presbyterians, and other Protestant bodies are well represented and there is a considerable number of Roman Catholics and Jews. Education is rapidly extending. The census pop. in 1921 was 858,118. Estimated population (1931), 1,050,667.

History. Jamaica was discovered by Columbus in 1494, in his second expedition to the New World. In half a century the cruelty of the Spanish conquerors exterminated the natives. It was taken by Cromwell in 1655, and ceded to England by the Treaty of Madrid in 1670. After the abolition of slavery the prosperity of Jamaica greatly decreased, and this led to the importation of coolies to work on the estates.

In 1865 a serious revolt broke out among the negroes at Morant Bay, and was put down with considerable severity by Governor Eyre. After that disaffection disappeared, and prosperity has much increased. But a cyclone in 1903 caused immense damage, and an earthquake in 1907 overthrew Kingston, and resulted in the loss of more than 1,000 lives. A disastrous cyclone visited the western part of the island in Nov., 1912.—

BIBLIOGRAPHY: W. J. Gardner, *History of Jamaica*; H. G. de Lisser, *Twentieth Century Jamaica*; W. Jekyll, *Jamaican Song and Story*; E. M. Cook, *Jamaica*; F. Cundall, *The Handbook of Jamaica*; *Handbook of Jamaica* (annual—published in London); *Guide to Jamaica* (Jamaica Tourist Assoc.).

JAMALPUR (*ja*-mäl-pör'), a town of Hindustan, in Monghyr district, Bengal, with large workshops belonging to the East India Railway Company. Pop. 23,111.—Also a town in Maimansingh district, Bengal, on the Brahmaputra. Pop. 15,350.

JAMBUSAR', a town of British India, Broach district, Bombay Presidency, 27 miles north-west of Broach. Pop. 12,100.

JAMES, ST., called the **Greater,** the son of Zebedee and the brother of John the Evangelist. Christ gave the brothers the name of Boanerges, or *sons of thunder*. They witnessed the transfiguration, the restoration to life of Jairus's daughter, the agony in the garden of Gethsemane, and the ascension. St. James was the first of the Apostles to suffer martyrdom, having been slain by Herod Agrippa A.D. 44. There is a tradition that he went to Spain, of which country he is the tutelary saint.

JAMES, ST., called the **Less,** the brother or cousin of our Lord, who appeared to him in particular after His resurrection. He is called in Scripture the *Just*, and is probably the Apostle described as the son of Alphæus. He was the first bishop of Jerusalem, and in the first apostolic council spoke against those wishing to make the law of Moses binding upon Christians. The progress of Christianity under him alarmed the Jews, and he was put to death by Ananias, the high-priest, about A.D. 62. He was the author of the epistle which bears his name.

JAMES I of Scotland, one of the Stewart kings, born in 1394, was the son of Robert III by Annabella Drummond. In 1406 his father wished him to be conveyed to France in order that he might escape the intrigues of his uncle, the first Duke of Albany; but the vessel in which he was being conveyed was taken by an English squadron, and the prince was carried prisoner to London. Here he received an excellent education from Henry IV, and, to relieve the tedium of captivity, he applied himself to those poetical and literary pursuits in which he so highly distinguished himself.

Robert III died in 1406, but James was not allowed to return to his kingdom till 1424. Before his departure he married Joanna Beaufort, daughter of the Earl of Somerset, a lady of the blood royal of England. On his return to Scotland he caused the second Duke of Albany and his son Murdoch to be executed as traitors, and proceeded

to carry on vigorous reforms, and, above all, to improve his revenue and curb the ambition and lawlessness of the nobles. The nobility, exasperated by the decline of their power, formed a plot against his life, and assassinated him at Perth in 1437.

His poem *The King's Quair* (or Book) entitles him to high rank among the followers of Chaucer. Two humorous sketches of mediæval social life in Scotland, *Christ's Kirk on the Green* and *Peblis to the Play*, used to be attributed to him, but on insufficient grounds.—Cf. Andrew Lang, *History of Scotland*.

JAMES II, King of Scotland, son of James I, born in 1430, and was thus when his father was assassinated in 1437 under seven years of age. During the minority his kingdom was distracted by struggles for power between his tutors Livingston and Crichton and the great House of Douglas. In 1449 he married Mary of Guelderland. James found the royal power menaced by the great family of Douglas, and he invited the eighth Earl of Douglas to Stirling Castle, to persuade him to abandon a league of nobles which had been formed in opposition to the Crown.

The interview ended in the king fatally wounding his guest (Feb., 1452). The murder led, three years later, to the conquest and forfeiture of the Douglas territories. James met his death in Aug., 1460, by the burst-

James II of England

ing of a cannon at the siege of Roxburgh Castle, which he was trying to recover from the English.—Cf. Andrew Lang, *History of Scotland*.

JAMES III, King of Scotland, son of James II, was born in 1451. The kingdom during his minority was governed in turn by Bishop Kennedy and the Boyd family. James throughout his reign was much under the influence of favourites, and he quarrelled with his brother, the Duke of Albany, who obtained English aid and invaded Scotland. When James marched to

James IV of Scotland

meet him, the nobles seized and hanged some of his favourites, including Cochrane, an architect, who was specially unpopular.

Albany was restored but soon afterwards expelled, and James continued to be on bad terms with his nobles, and was murdered in 1488 after a battle at Sauchieburn, near Stirling, fought against his rebellious lords. By his marriage, in 1469, with Margaret of Denmark he brought Orkney and Shetland into the Kingdom of Scotland.

JAMES IV, King of Scotland, born 1473, son of James III, was in his sixteenth year when he succeeded to the throne, and was, either voluntarily or by compulsion, on the side of the nobles who rebelled against his father. During his reign the ancient enmity between the king and the nobility seems to have ceased. His frankness, bravery, skill in manly exercises, and handsome person won the people's hearts, and he ruled with vigour, administered justice with impartiality and passed excellent laws.

Henry VII, then King of England, tried to obtain a union with Scotland by politic measures, and in 1503 James married his daughter, Margaret. A period of peace and prosperity followed. French influence, however and the discourtesy of Henry VIII in retaining the jewels of his sister and in encouraging the border chieftains hostile to Scotland, led to angry nego-

tiations, which ended in war. James invaded England with a large force, and himself and many of his nobles perished at Flodden Field in 1513.

JAMES V of Scotland, born in 1512, succeeded in 1513, at the death of his father, James IV, when only eighteen months old. His cousin, the Duke of Albany, a Frenchman by birth and education, was the regent during his childhood, and, owing to Albany's incompetence and the intrigues of the queen-mother, Margaret of England, the period of his long minority was one of lawlessness and gross misgovernment.

James assumed the reins of government in his seventeenth year. He married Magdalen, daughter of Francis I of France, and on her death Mary of Lorraine, daughter of the Duke of Guise. Henry VIII, having broken with Rome, and eager to gain over his nephew to his views, proposed an interview at York; but James never came, and it is known that Henry hoped to kidnap him.

A rupture took place between the two kingdoms, but James was ill supported by his nobles, and the disgraceful rout of his troops at Solway Moss broke his heart. He died in 1542, seven days after the birth of his unfortunate daughter Mary.

JAMES I of England and VI of Scotland, the only son of Mary, Queen of Scotland, by her cousin Henry, Lord Darnley, was born at Edinburgh Castle in 1566. In 1567 (his mother being forced to resign the crown) he was crowned at Stirling, and his childhood was passed under the direction of the Earl of Mar, and the tuition of the famous Buchanan. He had much trouble with his nobles, a party of whom made him captive at Ruthven Castle in 1582; but a counter party soon set him at liberty.

These disputes were connected with the ecclesiastical controversies of this period, James, from his youth onwards, being determined to destroy the power of the Presbyterian clergy. When his mother's life was in danger, he exerted himself to some extent in her behalf (1587); but her execution took place, and he did not venture upon war. In 1589 he married Princess Anne of Denmark. In 1603 he succeeded to the crown of England, on the death of Elizabeth, and proceeded to London. One of the early events of his reign was the Gunpowder Plot (q.v.). He soon allowed his lofty notions of divine right to become known, got into trouble with Parliament, and afterwards endeavoured to rule as an absolute monarch, levying taxes and demanding loans in an arbitrary manner. Between 1606 and 1610 he succeeded in establishing Episcopacy in Scotland.

In 1613 his daughter Elizabeth was married to the Elector Palatine, an alliance which ultimately brought the present royal family to the throne. He wished to marry his son Charles, Prince of Wales, to a Spanish princess, but this project failed, and war was declared against Spain. The king, however, died soon after in 1625.

James, though possessed of good abilities and a good heart, had many defects as a ruler, prominent among them being subservience to unworthy favourites and disregard for the kingly dignity. He was also vain, pedantic, and gross in his tastes and habits. His name is sullied by the part he played in bringing Raleigh to the block. In his reign the authorized translation of the Bible was executed.—BIBLIOGRAPHY: S. R. Gardiner, *History of England*; J. H. Burton, *History of Scotland*; T. F. Henderson, *James I and VI*.

JAMES II of England and VII of Scotland, second son of Charles I and of Henrietta Maria of France, was born in 1633, and immediately created Duke of York. During the Civil War he escaped from England and served with distinction in the French army under Turenne, and in the Spanish army under Condé.

At the Restoration in 1660 he got the command of the fleet as Lord High-Admiral. He had previously married Anne, daughter of Chancellor Hyde, afterwards Lord Clarendon. In 1671 she died, leaving two daughters, Mary and Anne, both of whom were subsequently sovereigns of England and Scotland.

Having openly avowed the Roman Catholic faith, on the Test Act being passed to prevent Roman Catholics from holding public employments he was obliged to resign his command. He was afterwards sent to Scotland as Lord High Commissioner, where he persecuted the Covenanters. He succeeded his brother as king in 1685, and at once set himself to attain absolute power. A rebellion headed by the Duke of Monmouth (his nephew) was easily put down, and this encouraged the king in his arbitrary measures. He even accepted a pension from Louis XIV that he might more readily effect his purposes, especially that of restoring the Roman Catholic religion. The result of this course of action was the Revolution of 1688 (*see* ENGLAND), which immediately followed the birth of a male heir by the king's second wife, Mary of Modena.

When his son-in-law, William of Orange, landed in Nov., 1688, James found himself completely deserted and fled to France, where he was received

with great kindness and hospitality by Louis XIV. Assisted by Louis, he was enabled in 1689 to attempt the recovery of Ireland; but the battle of the Boyne, fought in 1690, compelled him to return to France. All succeeding projects for his restoration proved equally abortive, and he spent the last years of his life in ascetic devotion. He died at St. Germain in 1701. —BIBLIOGRAPHY: Lord Acton, *Lectures on Modern History*; Allan Fea, *James II and his Wives*.

JAMES III, the Pretender. *See* STEWART, JAMES EDWARD FRANCIS.

JAMES, George Payne Rainsford, English novelist, born in London in 1801, died in 1860. While still very young he produced, in 1822, a *Life of Edward the Black Prince*. Some years afterwards he composed his first novel, *Richelieu*, which was shown in manuscript to Sir Walter Scott, and published in 1829. Its success determined him towards fiction, and a series of novels, above sixty in number, followed from his pen in rapid succession, besides several historical and other works.

Among them may be mentioned: *Darnley*, *De L'Orme*, *Philip Augustus*, *Henry Masterton*, *Mary of Burgundy*, *The Gipsy*, *History of Chivalry*, and a *Life of Charlemagne*. Subsequently he accepted the office of British Consul, first at Richmond, Virginia, and afterwards at Venice, where he died.

JAMES, Henry, American novelist and essayist, a younger brother of William James, was born in New York 1843, died in 1916. He lived much on the European continent and in England. Destined for a legal career, he soon turned his attention to literature, and his novels and tales, which depend for their interest on the portrayal of character rather than on incident, are numerous.

Among them are: *Daisy Miller*, *A Passionate Pilgrim*, *Roderick Hudson*, *The Portrait of a Lady*, *Tales of Three Cities*, *The Bostonians*, *Princess Casamassima*, *The Reverberator*, *The Tragic Muse*, *The Other House*, *The Spoils of Poynton*, *What Maisie Knew*, *The Wings of a Dove*, *The Golden Bowl*, *Julia Bride*, and *The Outcry*.

He also wrote the *Life of Hawthorne* in the English Men of Letters Series, *French Poets and Novelists*, &c. Henry James became a naturalized British subject in 1915, and received the O.M. in 1916, shortly before his death.—Cf. F. M. Hueffer, *Henry James: a critical Study*.

JAMES, Henry, Lord James of Hereford, English statesman, born at Hereford in 1828, died in 1911. He was educated at Cheltenham College, called to the Bar in 1852, and became Queen's Counsel in 1869. He was Liberal member of Parliament for Taunton from 1869 to 1885, being returned for Bury in the latter year. In 1873 he was appointed Solicitor-General by Gladstone, and in the same year gained the office of Attorney-General, with a knighthood; in 1880, when Gladstone returned to power, he was again made Attorney-General.

When, in 1886, Gladstone offered him the post of Lord Chancellor, he declined office owing to his views on Home Rule, being from that time a Liberal Unionist. He was counsel for the *Times* in the great Parnell case. In 1895 he was created a peer as Baron James of Hereford, and was appointed Chancellor of the Duchy of Lancaster in the Unionist ministry. This latter post he resigned in 1902. The title became extinct on his death.

JAMES, William, American psychologist and philosopher, born in New York 11th Jan., 1842, brother of Henry James, the novelist, died 26th Aug., 1910.

Educated in private schools, he studied at the Lawrence Scientific School, and graduated from Harvard Medical School in 1870. In 1872 he started to teach at Harvard, and in 1881 was appointed professor, occupying at first the chair of anatomy and physiology, and afterwards those of psychology and philosophy.

He was Ingersoll lecturer at Harvard University (1898), Gifford lecturer at Edinburgh (1899–1901), and Hibbert lecturer at Manchester College, Oxford (1909).

What distinguished James, characterized his writings, and made his influence and reputation so great was not only his keenness and originality, and his subtle reasoning power, but the freshness of his style and the lucid exposition of his theories. If not entirely the originator, James was the foremost exponent of the doctrines of radical empiricism and pragmatism (q.v.). In the field of analytical psychology James's achievements were considerable. His works include: *Principles of Psychology* (1890), *The Will to Believe* (1897), *Human Immortality* (1898), *The Varieties of Religious Experience* (1902), *Pragmatism* (1907), *The Meaning of Truth* (1909), *Some Problems of Philosophy* (1911), and *Essays in Radical Empiricism* (1912). —BIBLIOGRAPHY: H. V. Knox, *The Philosophy of William James*; E. Boutroux, *William James*.

JAMESON, Sir Leander Starr, South African politician, was born at Edinburgh in 1853, died in 1917. He studied medicine at University College Hospital, London, and took his M.D. degree in 1877. In 1878 he went to

South Africa, settling in practice at Kimberley. He came into close touch with Cecil Rhodes, and in 1889 joined the pioneer expedition to Matabeleland under the auspices of the South Africa Company.

In 1891 he was made administrator of Rhodesia, and in 1895 he led the raid on Johannesburg. For this he was tried and imprisoned in England, but was later released. He became a member of the legislature of the Cape in 1900 and from 1904–8 was Prime Minister. In 1911 he was made a baronet, and in 1913 chairman of the British S. Africa Company. He died in London, 26th Nov., 1917.

JAMESONE, George, Scottish portrait-painter, the son of an architect at Aberdeen, was born there in 1581, died at Edinburgh in 1644. He studied under Rubens at Antwerp, where he had Vandyck as a fellow-pupil. Returning to his native country in 1628, he became famous as a portrait-painter. He also painted historical pieces and landscapes. His excellence consists in delicacy and softness of shading, and a clear and beautiful colouring.

JAMES RIVER, a river of the United States, in Virginia, which passes the towns of Lynchburg and Richmond,andcommunicates,through Hampton Roads and the mouth of the Chesapeake Bay, with the Atlantic. Its general course is east-south-east, and its length is 500 miles. The first English settlement in America was formed at Jamestown, 32 miles from the mouth of this river, in 1607.

JAMES'S BAY, the southern extension of Hudson Bay, called from Captain James, who wintered there in 1631–2 while trying to find the north-west passage. It has numerous rocks and islands, and its navigation is dangerous.

JAMESTOWN, capital of St. Helena. Pop. 2,500.

JAMESTOWN, a town of the United States, in New York, on the outlet of Chautauqua Lake, which supplies water-power, and is employed in several mills. It has manufactories of woollens and alpaca. Pop. (1930), 45,155.

JAMIESON, John, a Scottish philologist and theologian, was born at Glasgow 1759, educated for the ministry among the Antiburgher Seceders, and after having been settled for a time in Forfar, removed in 1797 to Edinburgh, where he spent the remainder of his life, and died in 1838.

The work by which he is chiefly known is his *Etymological Dictionary of the Scottish Language* (1808–9; Supplement 1825), highly valuable as an extensive collection of Scottish words, phrases, and customs.

JAMNAGAR, a seaport of India, Bombay Presidency, on the north west coast of theKathiawar peninsula, Gulf of Cutch. It has textile factories, and pearl fisheries. Pop. 42,495—The state of Jamnagar has an area of 3,791 sq. miles, and a pop. of 350,000.

JAMUNA (*ja-mu-nä'*), the name of several rivers of Northern India, the chief being the lower section of the Brahmaputra.

JANESVILLE, a city of the United States, in Wisconsin, on both sides of Rock River, with active trade and manufactures. Pop. (1930), 21,628.

JANINA (*yän'i-nä*), now **YANINA,** a town of Greece, situated near the Albanian frontier, 425 miles w.s.w.of Istanbul, beautifully situated on the margin of a lake stretching along the greater part of its western shore.

It has declined since the time when the notorious Ali Pasha, the Lion of Janina, resided here from 1788 to 1822. Its fortress and splendid seraglio, built on a promontory jutting down into the lake, are now in ruins. The town was taken by the Greeks during the first Balkan War on 5th March, 1913, and was occupied for a short time by the Allies during the European War. Pop. 20,485.

JAN'IZARIES, or **JANISSARIES** (Turk. *Jenitcheri*, new soldiers), an Ottoman infantry force, somewhat analogous to the Roman prætorians, part of them forming the guard of the Sultan. They were originally organized about 1330, and subsequently obtained special privileges, which in time became dangerously great. The regular janizaries once amounted to 60,000, but their numbers were afterwards reduced to 25,000. The irregular troops amounted to 300,000 or 400,000. Their power became so dangerous and their insurrections so frequent that several unsuccessful attempts were made to reform or disband them. At various times Sultans had been deposed, insulted, and murdered by the insurgent janizaries.

At last, in June, 1826, they rebelled on account of a proposal to form a new militia, when Sultan Mahmoud II, having displayed the flag of the Prophet, and being supported by their aga or commander-in-chief, defeated the rebels and burned their barracks, when 8,000 of them perished in the flames. The corps was abolished, and a curse laid upon its name. As many as 15,000 were executed, and fully 20,000 were banished.

JAN-MAYEN (*yän-mi'en*), a small volcanic island in the Arctic Ocean,

150 miles from the coast of East Greenland. In Beerenberg, an extinct volcano, it rises to the height of 6,870 feet. The island was discovered in 1611 by the Dutch navigator Jan Mayen.

JAN'SENISTS, or **JAN'SENISM,** the sect or party and its doctrines which owed their origin to the teaching of Jansenius (q.v.). In his great work *Augustinus,* published in 1640, Jansenius maintained the Augustinian doctrine of free grace, and recommended it as the true orthodox belief, in opposition to the semi-Pelagianism of the Molinists.

The book was condemned by Urban VIII in 1642, in the Bull *In Eminenti*; but its doctrines were supported by many distinguished French and other theologians, and the scholars of Port-Royal, namely, Nicole, Pascal, and Antoine Arnauld, undertook the defence of Jansenism. Another Bull, in which the Pope (1653) particularly condemned five propositions from the *Augustinus,* also met with a strong opposition.

In 1656 Alexander VII issued a special Bull by which the Jansenists were compelled either to recant or secede from the Roman Church. It was found impossible to force them to an unconditional subscription of this Bull; and in 1668 an agreement with Clement XI, by which a conditional subscription was permitted, obtained for them a temporary repose. The party stood its ground under the protection of Innocent XI (died 1689), who favoured them as much as Louis XIV and the Jesuits opposed them.

Father Quesnel's *Moral Reflections on the New Testament*—the most universally read book of this period—gave it new support, but also led to the Bull *Unigenitus* (in 1713), which condemned 101 propositions from the *Reflections.* This Bull excited much indignation in France, and was strongly resisted; but the Jansenists were rigorously persecuted unless they accepted the Bull unconditionally. In consequence great numbers emigrated to the Netherlands, and their power as a party rapidly declined. This was hastened from 1731 by the fanatical excesses of many Jansenists, especially of the Convulsionists (q.v.) and others, which encouraged ridicule, favoured repressive measures, and ultimately extinguished the Jansenists as a party in France.

As a sect, however, they still survive in the Netherlands, having a membership of about 8,000. They call themselves, by preference, the *disciples of St. Augustine.* Each bishop on his appointment notifies his election to the Pope, and craves confirmation. The non-acceptance of the Bull *Unigenitus,* however, has caused all their advances to be rejected, and as they have rejected the doctrine of the immaculate conception and the decrees of the Vatican Council, they stand further apart than ever from the orthodox Catholic Church, though between them and the Old Catholics there are friendly relations.—Cf. L. Séché, *Les Derniers Jansénistes.*

JANSE'NIUS, Cornelius (properly *Cornelisz Jansen*), a Dutch theologian, born in 1585, died in 1638. He studied at Utrecht, Louvain, and Paris; secured a professorhsip at Bayonne; returned to Louvain in 1617, where he obtained the degree of doctor, and took a prominent part in the affairs of the university. He was appointed professor of Scripture in 1630, and was promoted to the bishopric of Ypres in 1636. In this city he died of the plague, leaving an unblemished reputation for piety and purity of morals. He had just completed his great work the *Augustinus,* a book which gave rise to a great religious controversy. *See* JANSENISTS.

JANSSENS (jâns'sens), **Abraham,** Flemish historical painter, born about 1575, died about 1632. He was the contemporary and rival of Rubens, though he occupies a very subordinate place beside him. His work is notable for rich colour and bold design. Many of his pictures are in the Flemish churches, while others are in the galleries of Munich, Vienna, Berlin, Dresden, and Antwerp.

JANSSENS, Cornelis, or JOHNSON, Cornelius, painter, born in 1593 in London, probably of Dutch parents, died in Holland 1664. He worked in England from 1618 to 1643, and was employed by James I and Charles I. His work, some of miniature size, includes portraits of these two kings, Sir George Villiers, and John Milton as a boy. In 1643 he settled in Holland. His paintings are for the most part in private collections, but he is represented in the National Gallery.

JANUA'RIUS, ST., Bishop of Benevento, was beheaded at Pozzuoli in the beginning of the fourth century, a martyr to the Christian faith, and is honoured as the patron saint of the people of Naples, where his body lies buried in the crypt of the cathedral. His head, with two phials of blood, are preserved in a separate chapel.

These phials are brought near the head of the saint on three festivals each year, notably 19th Sept., the anniversary of the martyrdom. On these occasions, if the blood becomes of a clear red colour and moves briskly in the phial, the patron saint is said to be propitious, but by remaining congealed it betokens disaster.

JAN'UARY, the first month of the year, consisting of thirty-one days. It was by the Romans held sacred to Janus, from whom the name was derived. The Roman year originally began with March, and consisted of only ten months. Numa is said to have added January and February. *See* CALENDAR.

JANUS, an ancient Latin divinity, after whom the first month of the year was named. He was held in great reverence by the Romans, and was represented with two faces, one looking forward, the other backward. All doors, passages, and beginnings were under his care. His principal festival was New Year's Day, when people gave each other presents. The temple of Janus, which was open in time of war and closed in time of peace, was

Janus, from a Roman coin of Sextus Pompeius in the British Museum

shut only three times in the long space of 700 years—once in the reign of Numa, again after the first Punic War, and the third time under the reign of Augustus A.U.C. 744. Vespasian also closed it in A.D. 71. There was also a goddess, Jana, although she never became prominent in the State religion.—Cf. W. W. Fowler, *The Roman Festivals*.

JAPAN, an island empire in the North Pacific Ocean, lying off the east coast of Asia. It comprises the islands Honshiu (mainland), Kiushiu, Shikoku, Hokkaido (Yezo), the Chishima Islands (Kurils), and over four hundred others, together with Taiwan (Formosa), area 13,840 sq. miles; Chosen (Korea), area 85,228 sq. miles; Karafuto (Japanese Sakhalin), area 13,934 sq. miles; and Bokoto (Pescadores), area 49 sq. miles.

The total area of the above is 260,644 sq. miles; pop. (1930), 90,396,043. The largest island, Honshiu, Hondo, or Nippon, is 800 miles long, and from 50 to 100 miles broad. By the Japanese Nihon or Nippon is employed to describe the whole empire. The name 'Jipun,' altered by Europeans to Japan, is the Chinese designation.

Physical Features. The Japanese islands form part of the line of volcanic action commencing with the Aleutian Isles and terminating in the islands of South-Eastern Asia. The coasts of the larger islands are extremely irregular, being deeply indented with gulfs, bays, and inlets, which form magnificent harbours. The surface also is generally uneven, and in many instances rises into mountains of great elevation.

The Island of Honshiu is traversed throughout its whole length by a chain of mountains, the highest peak being Fuji-yama (12,230 feet), a dormant volcano covered with perpetual snow. Typhoons are of frequent occurrences and cause great damage, as do earthquakes and tidal waves. (*See* EARTHQUAKE.)

The minerals comprise copper, lead, iron, antimony, and sulphur; gold and silver are found, though not to a great extent. Coal is mined in various parts.

The rivers are of no great length; Tonegawa, the longest, is only about 172 miles. Biwa, in the south of Honshiu, is the principal lake, being some 50 miles in length, with an extreme breadth of 20 miles. The harbours most frequented by foreign vessels are Yokohama—the port of Tokyo, the capital—Kōbe (Hiogo or Hyogo), Nagasaki, Hakodate, Niigata, and Osaka.

Climate. The climate ranges from an almost Arctic cold in the north to a nearly tropical heat in the south. In the Island of Yezo winter begins about October and continues to April, its course being marked by severe frosts and snowstorms; while in Yokohama, again, the winter is genial, with a bright sky, and a temperature much like England. From July to September the thermometer often ranges as high as 95° in the shade.

Products. The vegetation of Japan is very varied, in consequence of its wide range of temperature. Rice of excellent quality, as also wheat, barley, sugar-cane, and millet are largely grown; while ginger, pepper, cotton, and tobacco are cultivated in considerable quantities. Tea is extensively planted. The Japanese are skilful gardeners, and the fruits raised include strawberries, melons, plums, persimmons, figs, loquats, and oranges. Of flowers and flowering shrubs the camellia, azalea, hydrangea,

lilies, peonies, the chrysanthemum, daphne, and wistaria are indigenous.

The forests are extensive; in the south the palm, banana, and bamboo flourish; while in the north, cedar, pine, maple, camphor, and the *kadsi* or paper-tree are abundant.

The chief domestic animals are the horse, which is small and hardy; the ox, which is used as a beast of burden; the dog, which is held sacred; and the cat, which is of a short-tailed species. Rabbits and guinea-pigs are household pets. Bantam fowls, chickens, ducks, and pigeons are reared for food.

Of the wild animals, deer are numerous in the north, bears are to be found in Yezo, while boars, wolves, badgers, foxes, monkeys, and hares are not uncommon. Birds are plentiful: falcons, pheasants, ducks, geese, teal, storks, pigeons, ravens, larks, pelicans, cranes, herons, &c.

Fish is one of the chief foods, the principal varieties being salmon, cod, herring, sole, and mullet. There are also tortoises, lizards, scorpions, and centipedes; and of the insect tribes there are white-ants, winged grasshoppers, and several beautiful varieties of moths. A considerable number of the Japanese animals are the same as those of Britain, or little different.

People. The Japanese may be regarded as belonging to the great Mongolian family, though ethnologists recognize more than one element in the population. They are generally distinguished by broad skulls and high cheek-bones; small black eyes, obliquely set; long black hair, and a yellow or light-olive complexion; some are good-looking, and many are well-made, active and nimble. They are a frugal, skilful, persevering, courageous race, who combine these characteristics with much frankness, good humour, and courtesy.

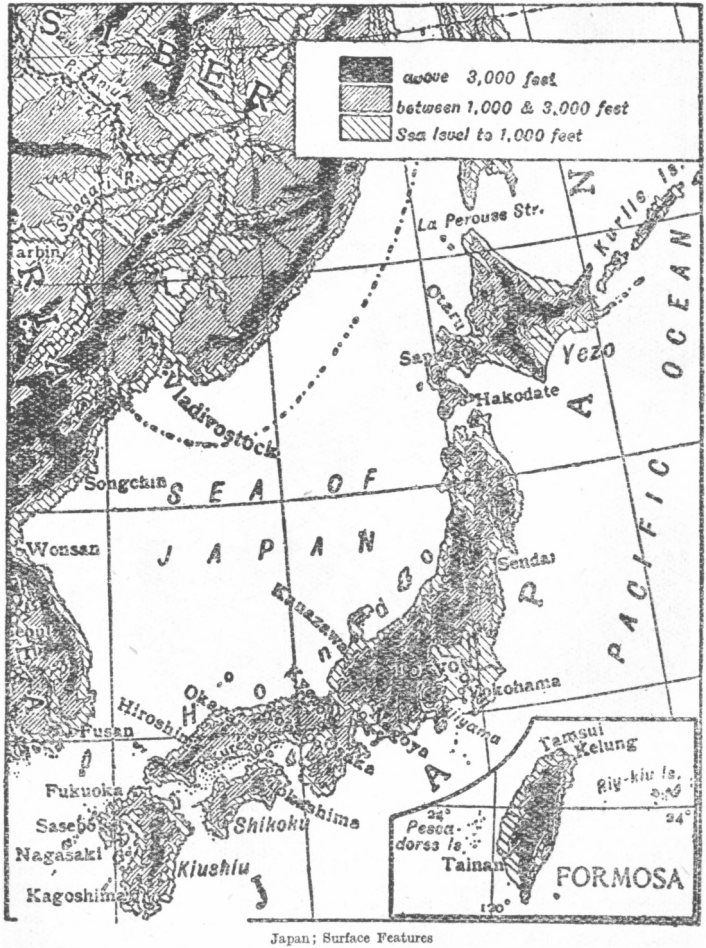
A Japanese gentleman's dress is a loose garment made of silk, gathered in at the waist by a girdle, and extending from neck to ankle; while over this is thrown a wide-sleeved jacket. In the country a short cotton gown is worn, while the lower classes generally

Japanese Tea Plantation and Rice Fields

wear but scant clothing. The hair is shaved off the front part of the head, while on the back and sides it is gathered up into a knot and fastened with long pins.

The Japanese are a holiday-loving people, and delight in the theatre.

Their two principal religions are Buddhism and Shintoism, The chief observances of Shintoism are an-



Japan; Surface Features

As regards both clothing and hairdressing the women very much resemble the men. They also paint and powder themselves. Polygamy is not practised, but a husband may have as many concubines as he can afford.

cestral worship and sacrifice to departed heroes. Buddhism is the popular religion. A considerable number of Christian missionaries are actively engaged in the country. The Japanese language is dual in its

nature. Originally a polysyllabic Mongolian tongue, it has been greatly enriched by the addition of many Chinese words, the latter being much used by the literary and governmental classes.

Industries and Trade. In native and imitative manufactures the Japanese are exceedingly ingenious. Their artistic treatment of copper, iron, bronze, silver, and gold is of the finest; while in stone carvings, mosaics, wicker, tortoiseshell, crystal, leather, and especially in wood lacquer-work, they are skilful in the highest degree. Of textile fabrics they excel in cotton goods, crapes, camlet, brocades, but chiefly in figured silk. Paper is largely made, and its uses—from a house to a handkerchief—are manifold.

Japanese decorative art is remarkable for patient but facile treatment of bird, beast, and flower; the absence of perspective and chiaroscuro seems even to add to its effect. The modern art productions, however, have been debased by European influence. In recent times factories and work-shops of the European type have sprung up, cotton-mills being especially numerous, and few modern industries are now unrepresented in Japan.

The chief export is raw silk, others are silk goods, cotton yarn, tea, coal, copper, matches, cotton goods, straw plait, porcelain, &c., while the imports are mostly raw cotton, textile fabrics, machinery and metal goods, sugar, mineral-oil, rice, flour, &c. The exports in 1932 were valued at £143,936,683, the imports at £146,128,310.

Communications. Railways in 1931 had a length of 13,363 miles. In 1929 3,492 miles were electrified; telegraphs and telephones are common, while the postal system is excellent. A railway tunnel under the Moji-Shimonoseki Straits was begun in 1920.

Currency, Weights and Measures. The standard money unit is the gold *yen* or dollar, of the value of 2*s.* 0½*d.*, divided into 100 *sens*. The coinage consists of gold, silver, nickel, and copper pieces, from the value of 20 *yens* to $\frac{1}{10}$ *sen*. There is also a paper currency. The Metric system was made compulsory in 1921, but has not been enforced.

Constitution and Government. The government of Japan was formerly an absolute monarchy, but a new Constitution was proclaimed on 11th Feb., 1889, providing for the establishment of a House of Peers, partly hereditary, partly elective, partly nominated by the emperor or Tenno, and of a House of Commons of elected members. The Upper House numbers 404 members, the Lower House, 466, the latter being elected by all men twenty-five years of age.

There is also a Cabinet, which includes the Prime Minister, and the statesmen at the head respectively of the Foreign Office, the Treasury, the interior, war, navy, education, justice, agriculture and commerce, communications. There are resident ministers in most European countries and in the United States.

Education. Education is compulsory, the school age being from the sixth to the fourteenth year. There are five universities, one of these at Tokyo, and all supported by the Government.

Defence. Conscription is the rule, and the army is comparatively large and thoroughly efficient, as shown not only in the Russo-Japanese but also in the European War, when Japan dispatched, in 1918, 60,000 men to Siberia.

The navy has been considerably increased since the Russo-Japanese War, and is highly up-to-date and modern. Formerly the Japanese warships were built in Europe and mostly by British firms, but now there is a great modern dockyard and arsenal called the *Kawasaki* at Kobe, and a second yard, the *Mitsubishi*, at Nagasaki. The air personnel numbered 6,944 in 1932.

Finance. The estimated revenue for 1933–34 was £136,893,750; the total debt is over £720,021,197.

History. The Japanese profess to have an accurate chronology from 660 B.C., but it is not until the tenth century after Christ that their history can be traced with any detail. Buddhism entered the country in the sixth century from Korea; subsequently for several centuries the relations of Japan and China were very close, and Chinese civilization had an immense influence upon that of Japan. The country was nominally ruled by a long line of hereditary *Mikados* or emperors, but for several centuries previous to the year 1867 the real power was in the hands of the *Shogun* or Generalissimo at Yedo, the Mikado living in retirement at Kioto.

Marco Polo was the first European traveller who mentioned Japan, which he called Cipango, or Zipangou. The country was visited by the Portuguese Mendez Pinto in 1542, and soon after the Portuguese obtained permission to form a settlement at Nagasaki for purposes of trade. In 1549 Francis Xavier, the Jesuit missionary, arrived and converted many of the natives to Christianity; but the authorities, growing jealous of the Portuguese, and apprehensive of the results of the spread of Christianity, drove out the traders in 1585 and

commenced a fierce persecution of the converts.

In 1640 the Portuguese were finally expelled, and from that time for more than two centuries the only Europeans with whom the Japanese held intercourse were the Dutch, and they were kept closely shut up in their factory at Deshima (Nagasaki).

In 1854 both the United States and Great Britain obtained treaties which promised to open up a trade with Japan. But a much more important treaty was negotiated by Lord Elgin in 1858, by which five ports were opened to British commerce, the United States and other European countries securing like advantages.

In 1868 a revolution overthrew the power of the Shogun, and the Mikado was restored to his old authority. The Imperial residence was removed from Kioto to Yedo, which has continued to be the seat of government, but with its name changed to Tokyo (Eastern Capital).

Western ideas and Western civilization were now welcomed: the educational system was remodelled, and the laws recast; universal conscription was introduced instead of the custom of utilizing only the services of the warrior *samurai* class; the army and navy were organized and trained on Western lines, the finances of the country put on a sound basis, and a code of local government elaborated; lighthouses, railways, telegraphs, and telephones constructed, recourse being had in everything to the services and help of Western experts.

In 1875 the southern half of Sakhalin was given up to Russia in exchange for the Kuriles; in 1876 Korea had to sign a treaty of amity and commerce with Japan. At home a formidable rising of discontented *samurai* took place in 1877, and was only put down after a sharp struggle. Local government was then gradually introduced; in 1889 a Constitution was promulgated, and two years later the first Japanese Parliament met.

In 1894 events in Korea led to a war with China, the corrupt Korean Government having appealed to China when called upon for redress of injuries to Japanese subjects. In this war the Japanese followed up successes on land by the great naval victory over the Chinese fleet at the Yalu River, further triumphs being the capture of Port Arthur, Talienwan, and Wei-hai-wei, at which latter place the remains of the Chinese fleet was destroyed or captured. This ended the war, and by the Treaty of Shimonoseki (1895) China agreed to pay a large war indemnity and to hand over Port Arthur and the Liaotung Peninsula to Japan.

Russia, Germany, and France, however, stepped in and forbade the acquisition of this mainland territory, recommending the acceptance by Japan of Formosa and the Pescadores Islands by way of exchange. The national pride was deeply hurt by this interference, but the Japanese were not strong enough to resist it. They at once set themselves, however, to increase the strength and efficiency of their army and navy, a resolve in which they were confirmed by the 'lease' in 1898, and the subsequent fortification by Russia, of Port Arthur, in the same Liaotung Peninsula from which they themselves had been excluded.

The various Western nations still retained those rights of extra-territoriality by which their own courts in Japan were empowered to judge their subjects resident in that country, rights which now seemed to the Japanese insulting. Great Britain was the first European Power to give up the privilege of special jurisdiction by a new treaty concluded in 1894, to take effect in five years; and in 1899 the other nations followed the lead thus given.

During the Chinese 'Boxer' troubles in 1900 Japan was requested by the Powers to send a division to maintain order in the province of Pechili, and her soldiers took a distinguished part in the subsequent advance on Peking. In 1902 a defensive alliance for five years was concluded between Japan and Great Britain, for safeguarding their interests in China and Korea, the allies agreeing to stand neutral should one of them be attacked by another Power, but to intervene if more than one Power should join in the attack.

In the meantime Russia, disregarding her repeated promises to evacuate Manchuria by a fixed date (after occupying it ostensibly on behalf of order), had been, on the contrary, consolidating her position there with a view to ultimate annexation, and had been threatening the independence of Korea. Japan felt the Russian advances to be vital to her own national existence, and, after protracted negotiations, on 6th Feb., 1904, she suspended diplomatic relations, and gave Russia notice that she would take independent action to secure her interests.

Two days later the first shot of the war was fired by the Russians at Chemulpo, and the same night their adversaries made a successful torpedo attack upon the Russian squadron as it lay carelessly outside the harbour of Port Arthur. Following this initial success, which practically gave them for the time the mastery of the Pacific, Japanese troops were poured into

Korea, from which their opponents retired before them, the Russian main squadron being kept, in the meantime, confined to the neighbourhood of Port Arthur.

On 1st May, their fleet co-operating, the Japanese forced the passage of the Yalu River against the Russian defence and entered Manchuria; and later in the month General Oku's hard-won victory at Kinchau (Nanshan), on the narrow Kwantung isthmus, enabled them to seize Dalny, with its fine harbour, in close proximity to Port Arthur.

An attempt by the Russians to relieve the threatened fortress on 14th–15th June, at Telissu, proved disastrous to them. The Russian fleet at Port Arthur tried to escape to Vladivostok, but was headed off, while a subsequent sortie on 10th Aug. led to a naval combat ending in the defeat of the Russians, several of whose ships made their way to neutral ports and were disarmed. The main body again retreated within the harbour.

Four days later the Vladivostok squadron, which had come south for purposes of co-operation, was defeated by Admiral Kamimura in the Korean Straits. Meanwhile on land the Japanese had been steadily forcing the Russians northwards, and, as the result of continuous fighting round Liao-yang (27th Aug. to 3rd Sep.), compelled them by a flanking movement to evacuate the place after heavy losses on both sides.

In October battles on the Shaho cost the Russians 60,000 men and the Japanese 16,000, while the two armies subsequently faced each other in elaborately-fortified winter quarters on opposite banks of the river. In the meantime the different fortifications at Port Arthur, deemed by the Russians almost impregnable, though gallantly defended, had been gradually falling before the valour and determination of their assailants, who, by their final capture at the end of November of the position known as 203-Metre Hill, were enabled to fire directly on the Russian warships still within the harbour, thus releasing Admiral Togo's blockading squadron for a well-earned rest.

The capture of the strong forts of Ehrlungshan and Sungsushan in the closing days of the old year led to the capitulation of Port Arthur on 2nd Jan., 1905. The siege of Port Arthur, one of the most remarkable in history, was attended with an enormous sacrifice of life on both sides, more than one assault of the Japanese being repulsed with dreadful carnage. The next great event of the war was at Mukden, where a skilfully-concealed turning movement by the Japanese, now reinforced by Nogi's Port Arthur veterans and siege-guns, and by Kawamura, led to fierce fighting at the beginning of March.

The Japanese generalissimo, Oyama, by his superior dispositions and initiative, outflanked Kuropatkin's right wing; and although the stubborn resistance of the Russians, and particularly of the rear-guard, as well as the distances to be covered and the numbers engaged—the Russians probably had 326,000 troops in the field—prevented a great Russian disaster, Oyama was able to force his opponent, after losses amounting to 175,000, to abandon Mukden and retreat towards Kharbin.

At length the Russian 2nd and 3rd Pacific Squadrons, under Admiral Rozhdestvensky, after a lingering voyage from the Baltic, arrived in Far Eastern waters, only to be annihilated by Togo in the battle of the Sea of Japan (27th–28th May).

Soon after President Roosevelt intervened and persuaded the two belligerents to send representatives to America to discuss terms of peace; and plenipotentiaries met at Portsmouth, New Hampshire, at the beginning of August. The Japanese, having in the meantime occupied the Island of Sakhalin, long insisted upon its retention as one of the conditions of peace, this and the question of the payment by Russia of the costs of war being the two cardinal points of disagreement.

Finally the Japanese magnanimously waived the money payment, and accepted the Russian proposal to divide Sakhalin (Japan retaining the southern half), the other main articles of the treaty of peace agreed to on 5th Sept., 1905, and signed by the respective emperors six weeks later, referring to the recognition of Japanese preponderance in Korea, the transfer to Japan of the Russian leases of Port Arthur and its territory, and a simultaneous evacuation of Manchuria by both parties within eighteen months.

Thus Japan succeeded in gaining all the objects for which she went to war, and vindicated her right to be recognized as one of the leading nations of the world. At the end of the war Russia had some 500,000 men in the field, Japan probably more.

A new treaty of alliance between Britain and Japan was signed on 12th Aug., 1905, wider in scope than the previous treaty, and to hold good for ten years. This treaty was renewed and amplified in 1911. Its declared objects were to maintain peace in the regions of Eastern Asia and India, to preserve the rights of the contracting parties in those regions, and to ensure

the independence and integrity of the Chinese Empire; either party to assist the other against unprovoked aggression or attack.

When the European War broke out, Japan joined the Allies. Japanese troops captured Tsingtao on 1st Nov., 1914. By the Treaty of Versailles Japan was appointed mandatory to the former German possessions south of the equator, the Caroline Islands, and Marshall Islands. In 1931 the Council of the League of Nations met to consider the Manchurian dispute between China and Japan, and decided to send out a Commission of Inquiry under the League's auspices. The Earl of Lytton was appointed chairman.

Fierce fighting took place between Chinese and Japanese troops. In March, 1932, armistice negotiations opened and both countries accepted a British compromise formula for withdrawal of Japanese troops at Shanghai.

In 1933 war was renewed between China and Japan. Japan would not accept the finding of the League on the Manchurian question and signified her resignation.—BIBLIOGRAPHY: F. Brinkley, *Japan described and illustrated by Native Authorities*; E. W. Clement, *A Short History of Japan*; A Stead, *Japan and the Japanese*; H. Norman, *Real Japan: Manners, Morals, Politics*; J. H. Longford, *Japan and the Japanese*; *The Evolution of New Japan*; Y. Okakura, *Life and Thought in Japan*; S. Greenbie, *Japan, Real and Imaginary*; L. Hearn, *Japan: an Interpretation*.

JAPANNING is the act of applying varnish to such articles as wood, metal, leather, and papier mâché, in imitation of the lacquered work of Japan and China. The article to be japanned being made thoroughly dry, is first brushed over with two or three coats of seed-lac varnish to form the *priming*. The next coat of varnish is mixed with the *ground tint* desired, and where a design is intended it is now painted with colours. The whole is then covered with additional coats of varnish, which are dried and polished as applied. Shellac varnish or mastic varnish is employed, unless where the fineness or durability of the work requires the use of copal dissolved in alcohol. *See* LACQUERING.

JA'PHETH, the second son of Noah (*Gen.* ix, 24). His descendants, according to *Gen.* x, 5, peopled the isles of the Gentiles, and thus Japheth is often considered the ancestor of most European races.

JAPURA (*hà-pö'rà*), or **CAQUETA** (*kà-kā'tà*), a large river of South America, an affluent of the Amazon. It has its sources in the mountains of Colombia, and its whole length is upwards of 1,000 miles, the last 350 miles being in Brazilian territory. The navigation is interrupted by a great cataract, which is in lat. 1° 10′ s.; long. 72° 20′ w.

JAR'GON, or **JAR'GOON** (Ar. *zargun*), a greyish variety of zircon (q.v.) found in Ceylon. The name originated that of the element zirconium.

JARNAC (*zhär-nàk*), a town of France, in the department of and on the river Charente, where a battle was fought (13th March, 1569) between the Catholics under the Duke of Anjou and the Huguenots under the Prince of Condé. The Protestant forces were defeated. Pop. 4,550.—**Coup de Jarnac** is a phrase derived from the famous lucky backstroke of the Comte de Jarnac in his duel with Châteigneraie in 1547.

JAROSLAU (*yà'ro-slou*), or **JAROSLAW,** a town of Poland, in Galicia, formerly belonging to Austria. It lies on an affluent of the Vistula, 62 miles W.N.W. of Lemberg, with a castle and a handsome cathedral, manufactures of woollens and linens, &c. During the European War Jaroslau was taken by the Russians on 21st Sept., 1914, recovered by the Austrians soon afterwards, captured once more by the Russians in Oct., 1914, but again recovered by Austro-German troops in May, 1915. Pop. 20,500.

JAROSLAV (*yà'ro-slaf*), a town of Soviet Russia on the Volga, 162 miles north-east of Moscow. It is the see of an archbishop, and has a theological seminary and a college. Pop. 120,000.

JAR'RAH, a timber tree of Western Australia, the *Eucalyptus marginata* (or *rostrata*), yielding a very durable wood, useful for railway-sleepers, jetties, &c., not being liable to the attack of the white-ant and the ship-worm.

JAR'ROW, a borough of England, in Durham, on the Tyne, 6 miles below Gateshead. Its rapid growth from a village to a large town is due to the development of its shipbuilding and iron-smelting industries. The town contains a mechanics' institute, an infirmary, and the church of St. Paul's, where the Venerable Bede was buried, and where some of his relics are still preserved. It gives its name to a parliamentary division of Durham. Pop. (1931), 32,018.

JA'SHER, BOOK OF, a lost Hebrew work, twice mentioned in the Bible (*Josh.* x, 13 and 2 *Sam.* i, 18), and about which various conjectures have been made. Some authorities suppose

that it was a series of annals; others that it was a Hebrew minstrelsy celebrating the exploits of the national heroes. Whatever its contents may have been, it seems from the specimens preserved to have been metrical in form. The attempt made by Donaldson to reconstruct the *Book of Jasher* has met with little favour from Oriental scholars.

JASPAR, Henri, Belgian politician. He was born 28th July, 1870, and became a lawyer. In 1919 he took a prominent part in the work of restoring the country's industries and the same year he was elected a deputy. He took office as Minister of the Interior and then as Foreign Minister, a post he retained until 1925. Jasper was from the first a firm supporter of the League of Nations and was a member of the Court of International Justice at the Hague. In May, 1926, he became Prime Minister and Minister of the Interior, and he remained at the head of affairs until 1931.

JASMIN (zhȧs-man), **Jacques,** or **JAQUOU JAUSMIN,** the chief modern Provençal poet of France, inheritor of the language as well as the spirit of the troubadours, was born in 1798, and died in 1864. Himself of humble parentage, and by trade a hairdresser, all his poems and songs are written in the peasants' patois of the Garonne. His poetry deserved and acquired more than a local celebrity, and was warmly welcomed not only in Southern France, but throughout the whole of Europe.

His works were crowned by the Academy in 1852. His principal works are: *Lou Chalibari* (The Charivari), a mock-heroic poem; *L'Abuglo de Casicl Cuillé* (The Blind Girl of Castel Cuillé), his masterpiece in poetry, which has been translated by Longfellow; *Las Papillotos de Jasmin* (The Curl-papers of Jasmin); and *Lous dous frays-bessous* (The Two Twin-brothers), 1847.

JAS'MINE, JAS'MIN, or **JESSAMINE,** the popular name of plants of the genus Jasminum. They are graceful, branched, erect or climbing shrubs, with imparipinnate, trifoliolate, or simple leaves, and (usually cymose) white or yellow flowers, from some of which delicious perfumes are extracted. There are about 100 species, most of them Asiatic; some occur in South and a few in tropical Africa, while one is a native of Southern Europe. The Carolina jasmine is *Gelsemium nitidum.*

JASON, in Greek legend, King of Iolcos in Thessaly, celebrated for his share in the Argonautic expedition. On his return to Iolcos with Medea as his wife, he avenged the murder of his parents and his brother by putting Pelias to death.

Unable to retain possession of his throne, however, he fled to Corinth, where, after some time, he married Glauce (or Creusa), daughter of the king, and put away Medea and her children. (*See* MEDEA.) Different accounts are given of his death. *See* ARGONAUTS.

JASPER (Ar. *yasb, yashb*; Gr. *iaspis*), an impure coloured form of quartz or flint. It is entirely opaque, or sometimes feebly translucent at the edges, and presents almost every variety of colour. It is found in altered shales and metamorphic rocks. In many places banded jaspers pass into serviceable hæmatite iron ores.

Jasper takes a high polish, and is used for vases, seals, snuff-boxes, &c. There are several varieties, as red, brown, blackish, bluish, Egyptian (a striped brown variety).—**Agate Jasper** is jasper in layers with chalcedony.—**Porcelain Jasper** is only baked clay.

JASSY (yȧsh'shi), or **IASI** a town of Rumania, in Moldavia, on the Bachlui, several miles from the Prut. It is built on two hills, and covers a large space, the houses being generally provided with gardens. It has a university, a museum with a public library, a theatre, several hospitals, fine hotels and shops. There are few manufactures, but the trade is of some importance, and a great deal of business is done at the fair. During the European War, when, in Dec., 1916 the Rumanians were compelled to leave Bukarest, Jassy became the seat of the Goverment until the conclusion of the armistice. Pop. (1930), 102,595, over a third of whom are Jews.

JASZ-BERÉNY (yȧs-be-rāny'), a market town of Hungary, 38 miles, E.N.E. of Budapest, on both sides of the Zagyva. Pop. 26,791.

JA'TAKA, a story in which Buddha in one of his former births plays some part. The term is applied to a collection of such Jatakas, a work of about the third century A.D. containing legends relating to the birth of Buddha, and much prized by the Buddhists.

JATIVA (hȧ'tē-vȧ), a city of Spain, province of and 36 miles S.S.W. of Valencia, near the confluence of the Guardamar and Albayda. Pop. 14,500.

JAT'ROPHA, a genus of woody plants with alternate stipulate leaves and cymes of small flowers, belonging to the nat. ord. Euphorbiaceæ, for the most part inhabiting the tropical parts of America. Some species have stinging hairs. *J. elastica* yields an elastic substance used as caoutchouc. *See* PHYSIC-NUT.

JÁTS, a race of Hindu agriculturists of fine physique, providing very valuable recruits to the Indian army. In the sixteenth century the Játs were the preponderating factor in the Punjab, and, consequently, provided to a very great extent the original stock on which Sikhism was grafted by Nanak, the founder of that religion. To this day the most considerable and influential division of the Sikhs is that of the Ját, or, as it is called in this connection, Ját Sikh.

Sikhism was not the only proselytizing influence which affected the original Jats; large numbers of them also became Mahommedans, either from motives of policy or in some cases from *force majeure*. The Ját, both Hindu and Mahommedan, makes a fine soldier. His physique is excellent, and though he is perhaps not over-burdened with brains, yet his fighting powers and qualities of endurance more than counterbalance any shortcomings there may be in that direction.

In the Punjab Játs are found in greatest strength in the tract of country lying between the Indus, Jheium, and Chenab Rivers north of Multan, a district known as the Sind Sagar Doab. While in Rájputána and Sind they populate a considerable area to the south of Jodhpore and extending as far as the Indus.

Játs have in the past provided a complete cavalry regiment, the 14th Murrays Ját Lancers, and two infantry regiments, the 6th Royal Ját Light Infantry and the 10th Játs. The 14th Lancers has lately been amalgamated with the 15th, though it will still retain its Ját connection. The 6th Ját Light Infantry received the title Royal in 1920 as an honourable reward for its service in the European War. In addition to these units with a special Ját connection, several other regiments, both cavalry and infantry, enlist these fine soldiers.

JAUER (you'èr), a town of Germany, in Silesia, 10 miles S.S.E. of Liegnitz, on the Neisse, with manufactures of cigars, cloth, worsted, and leather. Pop. 13,550.

JAUNDICE is due to the presence of bile pigments in the blood, and is recognized by the yellow colour produced in the skin. The yellow tinge is first seen in the conjunctiva of the eye. There are two main types of jaundice: (1) *toxæmic*, due to the presence of some toxic body of chemical or microbic origin circulating in the blood; (2) *obstructive*, caused by the mechanical obstruction of the bile-ducts, due to pressure.

The *toxæmic* type is produced by various chemical poisons, such as chloroform, phosphorus, &c., and by the microbic poisons of such diseases as malaria, relapsing fever, syphilis, and yellow fever.

Obstructive jaundice may be produced by inflammation in the bile-duct itself, by the bile-duct being blocked by calculi (bile-stones); or as the result of pressure on the duct by tumours of the liver, pancreas, stomach, or upper part of the bowel. It is only in this type, sometimes called *black jaundice*, that the skin becomes a dark-green colour.

JAUNPUR (joun-pör'), a town of India, United Provinces, on the River Gúmti, over which there is a fine bridge. It is an old town, and has some beautiful specimens of architecture. Pop. 32,569.—The district has an area of 1,554 sq. miles; pop. 1,209,663.

JAURÈS, Jean Léon, distinguished French Socialist, born at Castres (Tarn) 3rd Sept., 1859, of well-to-do middle-class parents, assassinated 31st July, 1914. Educated in his native town and at the École Normale Supérieure, Paris, he became professor of philosophy at the Lycée for girls at Albi (Tarn), and later was appointed to the chair of philosophy at the University of Toulouse. In 1885 he was elected to the Chamber of Deputies. Four years later he was defeated, but was re-elected in 1893.

He joined the Socialist party, devoting his talents to the effort of transforming the political republic into an economic and social republic. Jaurès soon became chief parliamentary leader, playing a prominent part at all the Socialist congresses and conferences. His activity during the Dreyfus trial made him many enemies in France, and the hostility against him increased when he advocated international peace and the reduction of armaments, and opposed the Three Years' Army Service Bill in the French Chamber.

He was assassinated on the very eve of the European War by a youth named Raoul Villain. The assassin was tried in 1919 and acquitted.

JAVA, an island in the Indian Archipelago, the chief of the Dutch colonial possessions; capital, Batavia. It is separated by the Strait of Sunda from Sumatra, and by that of Bali from Bali, and extends about 630 miles from east to west; greatest breadth, 126 miles; area of Java and Madura, 50,057 sq.miles. Java and the smaller adjacent Island of Madura are divided into twenty-two provinces or residencies, of which the population in 1930 amounted to 41,719,524.

Volcanic mountain chains running from east to west, and rising to such points as Semiru (12,250 feet) and

Slamat(11,320 feet); low-lying marshy tracts in the north, with such safe landlocked harbours as Batavia and Surabaya; in the south a rocky unbroken coast washed by the heavy surf of the Indian Ocean—these are its chief characteristics.

Volcanic eruptions are not infrequent, the latest being in 1883, when much damage was done to life and property. The mountains, covered with large forests, are separated by exceedingly fertile valleys. With the exception of marshy tracts the climate is as salubrious as that of any other intertropical country; and the more elevated regions are even healthy.

Production. The vegetation is varied. Rice is the chief cereal, but coffee and sugar are the staple products; spices are also grown, and some cotton is raised. Other products comprise rubber, pepper, tobacco and tea. The famed poison-tree, or upas (*Antiaris toxicaria*), is a noted Javanese plant. The forests consists mainly of teak.

Fauna. There are about 100 kinds of mammalia inhabiting Java. These include the one-horned rhinoceros, tiger, panther, tiger-cat, wild hog, several kinds of deer, several monkeys (but not the orang-utan), and enormous bats. The ox, the buffalo, and the goat are among the domestic animals. Birds are numerous. Serpents of a venomous kind are frequent, as also are crocodiles, lizards, and the land tortoise.

People. The native population belong to the Malay race, and are brownish-yellow in complexion, with long thick black hair. They are sober, patient, and industrious, but quick to avenge affront. In religion they are nominally Mahommedan. The great mass are devoted to agriculture, living in villages each governed by a native chief. Most of the land belongs to the Dutch Government, which obtains a large revenue from the island.

Till 1882 it was the custom to utilize the forced labour of the natives in what was called the 'culture system.' In that year very many of these enforced services were abolished, and in 1914 the remainder were also abolished.

Commerce, &c. The principal exports are coffee, sugar, tea (the production of which is constantly increasing), tin, rice, cinchona, indigo, spices, tobacco, hides, and india-rubber. The exports to the United Kingdom in 1932 amounted to £4,745,375, and the imports to £2,458,361. Railways have been introduced, and telegraphic communication rapidly developed. A Governor-General rules Java and the whole of the Dutch East Indies.

History. The history of Java is unknown previous to the eleventh century, when the Hindus founded a dynasty and converted the natives to Brahmanism. This was overthrown by an invasion of the Mahommedans in 1478. Islamism was succeeded by the Portuguese, who arrived in 1511. They were followed by the Dutch in 1595, who wrested from them the supremacy.—BIBLIOGRAPHY: A. S. Walcott, *Java and her Neighbours*; J. F. Scheltema, *Monumental Java*; E. R. Scidmore, *Java: the Garden of the East.*

Javanese Dancing Girl

JAY, John, American jurist and statesman, born in 1745, died in 1829. In 1768 he was admitted to the Bar, and in 1774 was chosen a delegate to the first American Congress, which met at Philadelphia. In 1776 he was chosen President of Congress, and in 1779 he was appointed Minister Plenipotentiary to Spain. In 1782 he was appointed one of the Commissioners to negotiate a peace with Britain, and, along with Adams and Franklin, concluded a treaty with the British.

Returning to the United States, he was appointed head of foreign affairs, and afterwards Chief Justice. In 1794 he was sent as Envoy Extraordinary to Great Britain, and concluded a treaty which has been called after his name, and by which £200,000 was given to Americans as compensation on account of the illegal captures by British vessels, and the eastern boundary of Maine was fixed.

JAY, a genus and sub-family

(Garrulinæ) of birds belonging to the family of the crows (Corvidæ). The jays have the upper mandible or bill notched or indented near its tip, and the feathers on the top of the head are erectile, and can be elevated at will, to form a kind of crest. These birds are

Jay (*Garrulus glandarius*)

readily domesticated, possess a harsh grating note, and are admirable mimics. They feed on fruit, seeds, worms, insects, and the eggs and young of other birds, &c.

The common or European jay (*Garrulus glandarius*) is the size of an ordinary pigeon, the general colour is a light brown inclining to red, whilst the larger or primary wing-feathers are of a brilliant blue, marked out by bands of black. The blue colour reaches its highest brilliancy in the North American blue jay (*Cyanocitta cristātus*), which otherwise closely imitates its European representative both in size and habits. The blue jay is exceedingly well known in the United States. Another American jay is the Canada jay or 'whiskey jack' (*Perisoreus canadensis*), a bird of rather sombre colouring, but of the bold, noisy, and active habits of others of the jays.

JAZZY, name applied to certain American dance music and dance types of negro origin. It is an onomatopoïc word aptly describing the noisy, percussive features of the fashionable dance bands. This ragtime music, usually loud and in syncopated measures accompanied by novel musical effects, is played generally on the trombone and non-orchestral instruments such as the banjo, ukelele, saxaphone, xylophone, &c.

The word "jazzy" is also used to describe bizarre and inharmonious colour decoration.

JEBB, Sir Richard Claverhouse, English classical scholar, was born at Dundee 27th Aug., 1841, died 9th Dec., 1905. Educated at St. Columba's College, Dublin, the Charterhouse, and Trinity College, Cambridge, he graduated as senior classic in 1862. In 1869 he became public orator of the university, was professor of Greek at Glasgow from 1875 to 1889, and was then appointed regius professor of Greek at Cambridge.

His best-known works are: *The Attic Orators*; *Modern Greece*; a *Life of Richard Bentley*; *Homer: an Introduction to the Iliad and Odyssey*; his admirable edition of Sophocles, with notes and translation; and an edition of Bacchylides (1905). He was member of Parliament for Cambridge University from 1891 to 1905, was knighted in 1900, and received the O.M. in 1905.

JEBEL DRUZE, an autonomous territory of Syria, lying south of the Hausan in the territory of Damascus. *See* SYRIA and LEBANON.

JEDBURGH, a royal burgh of Scotland, county town of Roxburghshire, on the Jed, with the ruined church of an abbey, a magnificent structure, begun by David I; and a house where Queen Mary lived in 1556. The manufacture of woollen goods is carried on. Pop. (1931), 3,057.

JEDDAH, seaport and town of the Hejaz. Situated on the Red Sea it is 46 miles from Mecca of which it is the port. It exports hides, carpets, coffee and mother-of-pearl. Long a Turkish possession, it was taken by the Hejaz forces in 1916. Pop. 25,000.

Old house at Jedburgh, once inhabited by Mary, Queen of Scots

JEFFERIES, Richard, naturalist and author, born in Wiltshire in 1848, died in 1887. He began his literary career as a local journalist, and first attracted attention by a letter to the *Times* in Nov., 1872, on *The Wiltshire*

Labourer. In 1877 he moved to London, gaining a success the next year with his book *The Gamekeeper at Home*, which consisted of sketches of natural history and rural life.

He afterwards produced a number of works on similar subjects, together with a few novels. Among his more important works are: *The Amateur Poacher* (1880), *The Story of My Heart* (1883), *Life of the Fields* (1884), *The Open Air* (1885), and *After London, or Wild England* (1885).

JEFFERSON, Joseph, American comedian, born in 1829, died in 1905. He became an actor, a profession which his father, grandfather, and great-grandfather had followed, and speedily made a name for himself in such parts as Doctor Pangloss (*The Heir at Law*), Asa Trenchard (*Our American Cousin*), Bob Acres (*The Rivals*), &c. To English playgoers, however, he was best known for his finished impersonation of Rip Van Winkle, in his play of that name. In 1889 he published an *Autobiography*.

JEFFERSON, Thomas, the third President of the United States of America, was born 1743 at Shadwell, Virginia, died 4th July, 1826. He studied at the College of William and Mary, Williamsburg, and then commenced the study of law. In 1760 he was elected a member of the Provincial Legislature, and in 1775 he took his seat for the first time in Congress. It was he who drew up the draft of the Declaration of Independence, which (in a slightly modified form) was signed on 4th July, 1776.

From 1779 to 1781 he was Governor of Virginia. In May, 1784, Congress elected him Minister Plenipotentiary to France, in addition to Adams and Franklin; next year he was appointed sole minister, and his residence in Europe lasted above five years. On his return he was appointed Secretary of State by Washington, an office which he continued to fill until the end of 1793, when he resigned. In 1797 he was elected Vice-President of the United States; but he was seldom consulted by the President, and he was out of harmony with the Government.

In 1800 he was elected President. One of the public acts of his administration was the purchase of Louisiana from France, thus greatly extending the boundaries of the United States. In 1809 he retired to private life at his residence of Monticello, in Virginia, where he died on the fiftieth anniversary of the Declaration of Independence, almost at the same hour as John Adams, the second President.

Jefferson was the acknowledged head of the Republican party from the period of its organization. He published *Notes on Virginia*, and various essays on political and philosophical subjects, and a *Manual of Parliamentary Practice*, for the use of the Senate of the United States.—BIBLIOGRAPHY: G. Tucker, *Life of Thomas Jefferson*; T. E. Watson, *Life and Times of Thomas Jefferson*; J. S. Williams, *Thomas Jefferson: his Permanent Influence on American Institutions*.

JEFFERSON CITY, a town of the United States, capital of Missouri, on the River Missouri. Pop. (1930), 21,596.

JEFFERSONVILLE, a flourishing town of the United States, in Indiana,

President Jefferson

on a height above the Ohio, connected with Louisville by a fine bridge. Pop. 11,946.

JEFFREY, Francis, Lord, a Scottish judge and critic, was born at Edinburgh in 1773, and died in 1850. He was educated at Edinburgh High School, the University of Glasgow, and Queen's College, Oxford, and passed advocate in 1794. He took part in establishing *The Edinburgh Review* in 1802 (with Sydney Smith, Lord Brougham, and others), and after two numbers had been issued was installed as its editor, a position he held for twenty-six years.

In 1831 he was made Lord-Advocate, and he sat for several years as member of Parliament for Edinburgh. He was made a Lord of Session in 1834, and continued during a period

of sixteen years to be one of the ablest and most popular judges of the Supreme Court in Scotland.—Cf. H. T. Cockburn, *The Life of Lord Jeffrey.*

JEFFREYS, George, first Baron, English judge, was born in 1648, and died in the Tower, in 1689. Soon after commencing his professional career he was chosen recorder of London; and he was appointed, successively, a Welsh judge and Chief Justice of Chester, created a baronet in 1680, and afterwards appointed Chief Justice of the King's Bench.

He was one of the advisers and promoters of the arbitrary measures of James II; and for his sanguinary and inhuman proceedings against the adherents of Monmouth on the 'bloody western circuit' was rewarded with the post of Lord High Chancellor (1685). On the arrival of the Prince of Orange, the Chancellor, who had disguised himself as a seaman, was detected and carried before the Lord Mayor, who sent him to the Lords in Council, by whom he was committed to the Tower.—Cf. H. B. Irving, *Life of Judge Jeffreys.*

JEHO'VAH is the proper name of the God of the Hebrews, the English Bible's equivalent for the sacred personal name, which occurs 6,823 times in the Hebrew Old Testament. The pronunciation, the derivation, and the origin of the name are uncertain.

(*a*) The pronunciation 'Jehovah' is certainly erroneous. It is a mediæval, hybrid formation, due to the fact that the consonants of the Hebrew term YHWH were supplied with vowels answering to the terms for Lord (Adônai) or God (Elôhim). The Jews shrank in superstitious reverence from pronouncing the actual name or Tetragrammaton, and devised this method of employing the consonantal framework.

Jehovah, therefore, is no more than a conventional and convenient makeshift. Scholars are now agreed on philological evidence that the original pronunciation must have been something like 'Yahweh.'

(*b*) The etymology is more obscure. One derivation is offered in Ex. iii, 14, 15, where Moses asks for information about the name of the God who is sending him to lead Israel from Egypt, and is told by God, "I will be what I will be." The meaning of his interpretation is that God will prove Himself to be something undefined, i.e. a helper and deliverer to His people. They are to expect Him to reveal Himself.

On the eve of the struggle that is to free them from the tyranny of Egypt, God encourages them by promising to be One who will ever manifest Himself to His people. The interpretation is therefore not a metaphysical definition, but a practical description of Himself. 'I will be' in Hebrew is 'Ehyeh,' and this is given as the clue to the meaning of Yahweh.

(*c*) This, however, can hardly be the origin of the name. It is a special application of it rather than the first introduction of it to Israel. Many attempts have been made to explain it from Semitic usage in a more concrete sense, e.g. as "He who creates, or makes to be," "He who casts down (lightning, hail, &c., or, his foes)," or "He who blows." On this last hypothesis Yahweh would be a storm-god, and many of the theophanics in the Old Testament connect Him with the storm or wind; He would then be "at first a wind-god like the Assyrian Ramman or the Teutonic Woden" (W. E. Addis, *Hebrew Religion*, 1906, p. 66).

Parallels to the name have been occasionally found in Canaanite and Babylonian mythology, and, according to Driver, it is possible that "a West Semitic deity, Ya-u, was known as early as 2100 B.C." But, apart from these remote traces, the name is embedded in the name of the mother of Moses, for Jochebed (*Ex.* vi, 20) means 'Yahweh is glory.' This suggests that the tribe of Levi, to which the family of Moses belonged, worshipped Yahweh already.

Other scholars, impressed by the close connection of Yahweh with Sinai have inferred that Moses had recently known the God during his stay with the Kenites, who dwelt near Mount Sinai. "It by no means follows that the Mosaic conception of Yahweh was not different from and higher than the conception of him among the Kenites; still less that the Kenites knew and worshipped no other God than Yahweh" (C. G. Montefiore, *Hibbert Lectures*, pp. 51, 52). But the impulse which actuated Moses at this era may have been derived from the Kenite or Midianite worship which he had just encountered in the nomad tribes round Mount Sinai.

However this may be, it is the special sense of the name and the special worship introduced by Moses which made Yahweh the God of the Hebrews. We are unable, in the conflicting state of the evidence, to determine to what extent, if at all, Yahweh was known to the Hebrews before the exodus. But thereafter Yahweh is their God pre-eminently, and this is recognized by other peoples, as, for example, on the Moabite Stone.

JE'HU, the founder of the fifth dynasty of the Kingdom of Israel. He was a commander in the army of

Jehoram, when Elisha sent one of the 'children of the prophets' to consecrate him King of Israel at Ramoth-Gilead (895 B.C.). He immediately attacked Jehoram, whom he slew in battle, and then entered upon a work of extermination in which were slain seventy of Ahab's children, forty-two brothers of Ahaziah, King of Judah, and Hezekiah himself, as also Jezebel. He died after a reign of twenty-eight years. His name occurs more than once on the monuments discovered at Nineveh.

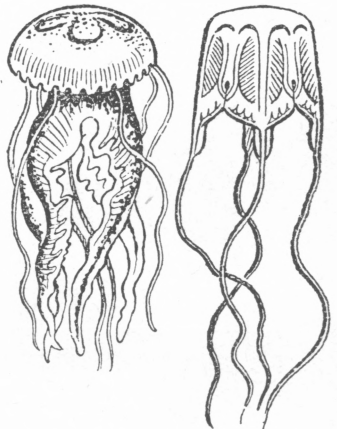
JELALABAD', a town of Afghanistan, near the right bank of the river and 75 miles E.N.E. of the town of Kabul. It was the scene of a successful resistance to an army of Afghans by a handful of British troops under Sir Robert Sale in the winter of 1841–2. Pop. about 6,000.

JELGAVA, formerly **MITAU**, a town of Latvia, formerly in Russia, capital of the government of Courland, in a low, flat, and sandy district on the Aa. Founded in 1271, the town was the residence of the Dukes of Courland during the sixteenth century. Pop. 33,048.

JELLICOE, John Rushworth, first Earl Jellicoe of Scapa, was born at Southampton, 5th Dec., 1859. He was educated at Rottingdean, and entered the navy in 1872. He served in the Egyptian War of 1882, and was the prizewinner at Greenwich (gunnery-lieutenants) in 1883. From 1898 to 1901 he was employed in China, and was Commandant of the Naval Brigade and Chief of Staff to Vice-Admiral Sir E. Seymour in 1900, during the attempt to relieve the Peking legations, being wounded in action. Director of Naval Ordnance from 1905 to 1907, he eventually became Rear-Admiral of the Atlantic Fleet, which he remained until his appointment as Third Sea Lord in 1908, when he combined with his duties those of Comptroller of the Navy. In 1910 he was posted to command the Atlantic Fleet, and in 1911 he took over the Second Squadron of the Home Fleet, striking his flag in 1912 on becoming Second Sea Lord. He was knighted (K.C.V.O.) in 1907.

Upon the outbreak of the European War, 4th Aug., 1914, Jellicoe was only a vice-admiral, but it had been arranged that he was to assume command in the event of general mobilization; he was accordingly posted to Scapa upon that date, as Commander-in-Chief, Grand Fleet. On 28th Nov., 1916, he was superseded by Sir David (now Earl) Beatty (q.v.), and went to the Admiralty as First Sea Lord, where he was actively engaged in perfecting a system of defence and agression against the growing 'U'-boat menace.

After a short time as Chief of Naval Staff, subsequent to the reorganization of the Admiralty in May, 1917, Jellicoe retired (Dec., 1917), and was raised to the peerage as Viscount Jellicoe of Scapa. The thanks of the nation and a grant of £50,000 were presented to him on 5th Aug., 1919, when he was promoted to Admiral of the Fleet and toured the colonies, advising upon matters affecting naval construction and policy. He was Governor-General of New Zealand from 1920 to 1924, and received an earldom in 1925. From 1928–32 he was President of the British Legion.



Jelly-fish. *Palayia noctiluca, Charybdea marsupialis*

Jellicoe's books, *The Grand Fleet* (1914–6) published in 1919 and *The Crisis of the Naval War* which first appeared in 1920, do much to show the difficulties with which he had to contend in the early organization of the faulty equipment and raw personnel of the newly mobilized Grand Fleet; but, however, they have singularly failed to vindicate the strategic plan which enabled the High Seas Fleet at Jutland to escape the 'Nelson touch' which the Grand Fleet were itching to administer. Among his decorations, Lord Jellicoe possesses the O.M. (1916), G.C.B. (1915), G.C.V.O. (1916), and the Grand Cross of the Legion of Honour.

JELLY-FISHES, or **MEDUSÆ**, the popular name of certain cœlenterate animals, of the class Hydrozoa, found in the sea, and often familiarly called

sea-blubbers and sea-nettles, from their appearance and stinging property.

When in the water they present a singularly beautiful appearance, one of the most common resembling a clear crystalline bell, which swims gracefully through the water by alternately expanding and contracting its body.

They are very voracious, and paralyse their prey by means of the nettling cells that stud their long stinging tentacles. The phosphorescence of the sea is partly due to the pale light which they diffuse in the darkness. *See* HYDROZOA.

JEMAPPES (zhĕ-măp), a town of Belgium, in Hainault, near Mons, on the Scheldt, celebrated as the place

Rathaus, at Jena

of the first great battle in the French revolutionary war, fought 6th Nov., 1792, when the French under Dumouriez defeated the Austrians. Severe fighting also took place here during the European War. Pop. 14,573.

JENA (yā'na), a town of Germany, in Saxe-Weimar, forming, since 1919, part of the Republic of Thuringia. It is an old-fashioned, uninteresting place, deriving importance only from its university (founded in 1558), which achieved its highest fame in the latter half of the eighteenth century, when among its teachers were Schiller, Hegel, Fichte, Humboldt, Schelling, and the Schlegels, while its students numbered above 1,000.

In 1931 there were 3,144 students and 202 professors and instructors, with an anatomical theatre, botanical garden, zoological museum and other scientific collections, observatory, and a library of 300,000 volumes. Optical and scientific instruments are made. Pop. (1925), 52,649.

The Battle of Jena, fought on 14th Oct., 1806, signalized the double defeat of the Prussians by the French. There were two separate engagements on the same day, one on the surrounding heights, between the Prussians under Hohenlohe and the French under Napoleon; and the other at Auerstädt, where the French general Davout was victorious.

JENNER, Edward, an English physician, celebrated for the introduction of the practice of vaccination as a preventive of smallpox. He was born at Berkeley, in Gloucestershire, in 1749, and died in 1823. After studying at Sodbury under Ludlow, the surgeon, and at London under the celebrated anatomist John Hunter, he settled in his native county as a medical practitioner.

It was about 1776 when he first began to direct his investigations definitely to the subject of smallpox, taking as his starting-point the belief, common among the peasants, that the casual cowpox acquired in milking cows was a preventive of the more terrible disease. From this, after many experiments, he elaborated his famous process of vaccine inoculation, which was made known to the world in 1798, and in the same year introduced into St. Thomas's Hospital.

His method at first met with great opposition from the medical profession, but was in the end universally accepted by his own and foreign nations. In 1802 a parliamentary grant of £10,000 was accorded him, and another of £20,000 in 1807, while congratulatory addresses were sent to him by Continental monarchs.

He died of apoplexy at his native place, and in 1858 a public statue was erected in his honour in London. He published *An Inquiry into the Causes and Effects of Cow-pox* (1798); *Further Observations on Variolæ Vaccinæ or Cow-pox* (1799); and a celebrated paper on the Cuckoo, in the *Philosophical Transactions*. *See* VACCINATION.—Cf. J. Baron, *Life of Jenner*.

JENNER, Sir William, born at Chatham in 1815, died in 1898. He was educated at University College London, where he graduated M.D. in 1844. In 1848 he became professor of pathological anatomy, and in 1857 of clinical medicine in the University College; in 1861 physician to the queen; in 1862 professor of the principles and practice of medicine in University College; in 1868 he was made a baronet, and in 1872 a K.C.B., in recognition of his services during the severe illness of

the Prince of Wales: in 1881 he was elected president of the College of Physicians.

He wrote a number of papers on specific diseases, and was the first to establish the difference in kind between typhus and typhoid fevers.

JENOLAN CAVES, a series of beautiful limestone caverns, on the Fish River, Westmorland county, New South Wales, discovered in 1841. An area of about 6 sq. miles round them is reserved as a public park, and the caves are lighted by electric light.

JEPHTHAH, one of the Hebrew judges, who defeated the Ammonites, but having rashly made a vow that if he was victorious he would sacrifice to God as a burnt-offering whatever should first come to meet him from his house, he was met on his return by his daughter, his only child, whom he sacrificed, in consequence, to the Lord (*Judges* xi, 29–40). Some commentators have maintained that this meant devoting her to perpetual virginity in the tabernacle. Jephthah ruled six years as a judge and general (*Judges* xi, xii).

The sacrifice of Jephthah's daughter is the subject of oratorios by G. Carissimi (1660), Handel (1751), and Reinthaler (1870), and of a Latin drama by George Buchanan.

JERBO'A (Dipus, &c.), a genus of small animals belonging to the ord. Rodentia or Gnawers, having extremely long hind limbs, which gives them an extraordinary power of leaping, so that their movement seems more like flying than running. The fore-limbs are armed with short powerful claws, with which they excavate their burrows and extract the roots on which they chiefly live.

They are gregarious and nocturnal in their habits, and hibernate during the colder seasons. The jerboas are found chiefly in Asia, Northern Africa, and North America. The typical species is the Egyptian form (*Dipus ægyptius*).

JEREMI'AH, the second of the great prophets of the Old Testament, flourished during the darkest period of the Kingdom of Judah, under Josiah, Jehoahaz, Jehoiakim, Jeconiah, and Zedekiah. He was called to the prophetic office about 629 B.C., in the reign of Josiah, and lived to see the capture of Jerusalem by Nebuchadnezzar in 586 B.C., who offered him a home at Babylon, but he preferred to stay amongst the wretched remnant of the people left in Judah. He is said to have been stoned to death in Egypt by some of his countrymen, who were infuriated by his rebukes.

He wrote two Old Testament books, the *Prophecies of Jeremiah* and the *Lamentations*. The text of the prophecies is in a somewhat confused state, there being no chronological order. Jeremiah wants the dignity and splendour of Isaiah, but exhibits great tenderness and elegiac beauty of sentiment.

In Hebrew the book of *Lamentations* is called *Ekhāh* (*How*, the first word of the book) and sometimes *Kinoth* (Dirges). Some critics also attribute to Jeremiah the book of *Deuteronomy* and several of the *Psalms*. *See* JEWS.—BIBLIOGRAPHY: S. R. Driver, *Introduction to the Literature of the Old Testament*; T. K. Cheyne, *Jeremiah: his Life and Times*.

Egyptian Jerboa

JEREZ (or **XERES**) (*he*-reth') **DE LA FRONTERA,** a town of South-Western Spain, in Andalusia, province of Cadiz, 16 miles N.N.E. of Cadiz. It is a well-built and flourishing town, with some handsome edifices, chiefly churches, and the Alcazar, an old Moorish castle in ruins. It is noted for its wine, well known under the name of sherry, which is exported in large quantities. A great battle was fought at Jerez in A.D. 711, and in 1362 Peter the Cruel had his wife, Blanche de Bourbon, murdered there. Pop. 67,076.

JEREZ (*he*-reth') **DE LOS CABALLEROS** (ká-vál-yā'rōs), a town of Spain, province of Badajoz, partly surrounded by a wall, which dates from the time of the Moors. Pop. 10,959.

JERICHO (jer'i-kō), a considerable town of ancient Judea, on a plain about 18 miles N.E. of Jerusalem, noted, especially in Solomon's time, for its balsam-gardens and its thickets of palm trees and roses, and carrying on a flourishing trade in balsam and spices. It was the key of Palestine, and was therefore invested by the Israelites who had passed the Jordan under Joshua to conquer this country. Its site is now occupied by the small village of Riha. During the European War Jericho was captured by Lord Allenby's troops in Feb., 1918.

JEROBO'AM, the name of two kings of Israel.—**Jeroboam I,** the son of Nebat, on Solomon's death (973 B.C.) was made king of the ten tribes who separated from Judah and Benjamin. He made Shechem his capital, forbade his subjects to resort to the temple at Jerusalem, and set up golden calves at the shrines of Dan and Bethel. He died in the twenty-second year of his reign.—**Jeroboam II,** the most prosperous of the kings of Israel, reigned 823–782 B.C. He repelled the Syrians, took their cities of Damascus and Hamath, and reconquered Ammon and Moab. But licentiousness and idolatry were prevalent during his reign. The authorities for the history of his time are 2 *Kings*, 1 *Chron.*, *Amos*, and *Hosea*.

JEROME, Jerome Klapka. English author. Born 2nd May, 1859, and educated in London, he was for a time a clerk and a teacher. He also did a little acting and in 1885 published *On the Stage and Off*. In 1889 Jerome made his name with *Three Men in a Boat*, a thoroughly humorous story. This was followed by *Idle Thoughts of an Idle Fellow*. He wrote several novels including *Paul Kelver* and *The Master of Mrs. Chilvers*. Of his many plays the best known is *The Passing of the Third Floor Back*; others include *New Lamps for Old* and *The Prude's Progress*. In 1892 Jerome helped to found a magazine, *The Idler*, and from 1893 to 1897 he edited a popular weekly called *To-Day*. He died 14th June, 1927.

JER'OME, ST. (Eusebius Hieronymus Sophronius), one of the most learned Fathers of the Latin Church, was born about A.D. 346 at Strido, near Aquileia, the capital of Venetia, of Christian parents. He was baptized in Rome before 366, went in 373 to Antioch in Syria, and in 374 retired to the desert of Chalcis, where he passed four or five years in severe mortifications and laborious studies.

He left his solitude to be ordained presbyter at Antioch, went to Constantinople to enjoy the instruction of Gregory Nazianzen, and in 382 returned to Rome, where his expositions of the Holy Scriptures gained many adherents, especially amongst the rich and noble ladies, two of whom, Marcella and Paula became celebrated for their piety. Paula accompanied him in 386 to Bethlehem, where their first work was to build a monastery, and a convent, over which Jerome and Paula respectively presided. There Jerome remained until his death about 420.

His voluminous writings include commentaries on the Bible, books on Church history and controversy, and letters. He took part in particular in the Origenist and Pelagian controversies. But his fame rests principally on his translation of the Bible into Latin from the original tongues; the version now known as the *Vulgate* is in the main the work of Jerome.—Cf. F. W. Farrar, *Lives of the Fathers*.

JEROME OF PRAGUE, a Bohemian reformer, born about 1360–70, in faith and sufferings the companion of the famous John Huss. Together they made a vigorous crusade against the dissoluteness of the clergy, and the worship of relics. When Huss was imprisoned in Constance, Jerome hastened to his defence, but was seized and carried thither in chains (1415).

After much suffering he consented to recant his heresies, but on being subjected to a new examination solemnly retracted his recantation, and made a vigorous vindication of the principles of Huss and Wycliffe. On 30th May, 1416, he was burned at the stake, and his ashes thrown into the Rhine.—Cf. William Gilpin, *Lives of John Wicliffe and of the most Eminent of his Disciples*.

JER'ROLD, Douglas, English humorist and playwright, born 1803, died in 1857. The son of the manager of Sheerness Theatre, he was for a short time a midshipman, and was afterwards bound apprentice to a printer in London. His first play, *More Frightened than Hurt* (1818), was not at first successful, but his *Black-eyed Susan* (1822) ran for 300 successive nights at the Surrey Theatre. Jerrold's subsequent dramas were: *The Rent-day*, *Nell Gwynne*, *The Housekeeper*, *The Prisoner of War*, *Bubbles of a Day*, *Time Works Wonders*, *St. Cupid*, *The Catspaw*, *The Heart of Gold*, and several others.

He contributed extensively to periodical literature, founding and conducting successively *The Illuminated Magazine* and *Douglas Jerrold's Shilling Magazine*, and subsequently editing *Lloyd's Weekly Newspaper*. To *Punch* he contributed his inimitable *Mrs. Caudle's Curtain Lectures* and *Punch's Letters to his Son*. Though a master of satire and repartee, his

sayings had no personal malevolence. —Cf. Walter Jerrold, *Douglas Jerrold, Dramatist and Wit*.

JER'SEY, the largest and most important of the Channel Islands, about 15 miles off the north-west coast of France; greatest length, east and west, about 12 miles; greatest breadth, 7 miles; area, 28,717 acres or 44·87 sq. miles. Its coast, particularly on the north, is extremely rugged, and precipitous, is deeply indented all round, and has a number of good bays and harbours, the chief of which are St. Aubin and St. Helier.

The island is fertile, abundantly wooded, and well cultivated. The climate is peculiarly mild and agreeable. Wheat is the principal cereal raised, and large quantities of grapes, peaches, melons, pears, and tomatoes are exported, also vegetables, and especially early potatoes for the London market. Cows of the famous Jersey or Alderney breed are reared and exported.

The lower classes speak a sort of old Norman-French dialect, while French is the language of the upper classes and the law courts. Jersey is governed by a Lieutenant-Governor and a Bailiff, both appointed by the Crown, and has its own legislature, known as the 'States.' Appeals lie to the king in council. Principal town, St. Helier. Pop. (1931), 50,455. *See* CHANNEL ISLANDS.

JERSEY CITY, a town in the United States, capital of Hudson county, New Jersey, on the Hudson, opposite New York, from which it is about a mile distant and with which it is connected by ferries. It possesses a number of large public and other buildings, notably the huge grain elevators near the river, the city hall, the court house and jail, various churches, and large public schools.

The manufacturing establishments are very numerous, and comprise glass-works, boiler-works, foundries, steel-works, breweries, sugar-refineries, chemical-works, watch-works, tobacco-works, and potteries. Its population is largely made up of the overflow of New York. Pop. (1930), 316,715.

JERUSALEM (Heb. *Yerushālayim*; Ar. *El-Kuds*, 'The Holy'), one of the most ancient and interesting cities in the world, in Palestine. It stands on an elevated site (about 2,500 feet above the sea) within the fork of two ravines, the Valley of Jehoshaphat (or of Kidron) on the east, at the foot of the Mount of Olives, and the Valley of Hinnom on the south and west, while a third ravine or valley—the Tyropœon—partially traverses it from south to north.

On the east side of this last valley is the traditional Mount Moriah, where anciently stood the palace and temple of Solomon. Immediately south of this stood probably the mountain fortress of Zion or City of David, but the view is also held that Zion or the City of David stood on the opposite or western side of the Tyropœon in the south-west of the present city, and to this the name of Zion is commonly given. Here are the Armenian quarter, the citadel, and the English church; north of the Armenian quarter is especially the Christian quarter.

Of three walls built for the defence of Jerusalem, the first wall, that of David, was for the defence of the City of David and the older part of Jerusalem on the south. The second wall took in a considerable area on the north-west, while a suburb, Bezetha, which grew up on the north, was enclosed by a third wall, built by Agrippa I. The present limits are much the same as those indicated by the third wall, but considerable areas on the south (including the English school and cemetery) are outside the modern walls. There are seven gates, one being quite modern.

The interior of the city is much occupied by mosques, churches, and convents. The houses are substantially built of stone, and present in most cases no windows to the streets, which accordingly—generally narrow, ill-paved, and sloping to the centre—are merely long lanes with dead walls on each side of them.

In the north-west quarter is the Church of the Holy Sepulchre, so called because alleged to contain under its roof the very grave in which the Saviour lay. This church, which was built by Helena, the mother of Constantine the Great, is remarkable for the richness of its decorations and the number of pilgrims by whom it is visited.

A large area in the east of the city is occupied by the enclosure known as El Haram-Esh-Sherif (The Noble Sanctuary), which is in the form of a regular parallelogram surrounded on all sides by a lofty wall. The most conspicuous building within is the Mosque of Omar, called also Kubbet-es-Sakhrah (Dome of the Rock), a splendid structure of octagonal form which occupies the site of the Jewish Temple.

Amongst the notable convents are the Latin convent, and the still more extensive Armenian convent, capable of accommodating 1,000 pilgrims. Within the last forty years or so a considerable improvement has taken place in the appearance of the city, as well as of the surrounding country.

Hotels with all modern conveniences and comforts have been erected for

the hosts of pilgrims and travellers who annually visit the place; and a railway now connects it with Jaffa. The water-supply is partly from rain-tanks, there being also a number of pools or reservoirs (that of Siloam lies south of the city, and the water is not very good).

In 1901 iron pipes were laid bringing water from a spring 7 miles to the south, but the supply was still inadequate, and immediately after the occupation of the city by the British a new water-supply system was inaugurated.

Till 1917 the city was governed by a 'Mutesarrif' immediately subject to the Porte. The joint Protestant bishopric, supported by England and Prussia, was dissolved in 1887, since when the English and German churches have been separately governed. The present pop. is about 62,678.

History. Jerusalem is first mentioned by name on the cuneiform tablets from Tell el-Amarna (about 1400 B.C.). At that period subject to Egypt, it was at a later date in the hands of the Jebusites. From them the lower part was wrested by Joshua, but the upper part continued in their possession till the time of David, who took up his residence in the stronghold of Zion, and made Jerusalem the capital of his kingdom. It reached the height of its glory under Solomon, after whose time it declined.

In 586 B.C. Nebuchadnezzar took and destroyed the city after a long siege, and carried off the inhabitants as captives to Babylon. The captivity lasted about seventy years, at the end of which the Jews were released by Cyrus. They returned to Jerusalem, and in 515 B.C. rebuilt the temple, though on a far less magnificent scale. The walls were not rebuilt till the time of Ezra and Nehemiah, 455 B.C.

The city had regained a considerable degree of prosperity, when, on the dissolution of the Macedonian Empire, it was sacked by Ptolemy Soter, who transported a great number of the inhabitants to Alexandria. In 168 B.C. it was again sacked and its walls levelled by Antiochus of Syria, but under the Maccabees, whose exploits have made them the greatest heroes of Jewish history, Jerusalem, in common with Judæa, became once more independent (165 B.C.). It next became tributary to Rome, and had been greatly beautified and enriched with a fine new temple by Herod when the Saviour appeared.

In A.D. 66 Jerusalem was taken by a party of Jews who had revolted against Rome. Titus, the son of the Emperor Vespasian, regained it in the year 70, after a terrible siege; the temple was burned, and the city razed to the ground. In A.D. 131 Hadrian ordered the city to be rebuilt, but the Jews, fearing profanation of the holy places, rebelled and took Jerusalem, which was only recaptured after a long struggle. It was then made a Roman colony, under the name Aelia Capitolina, and Jews were forbidden to approach it on pain of death.

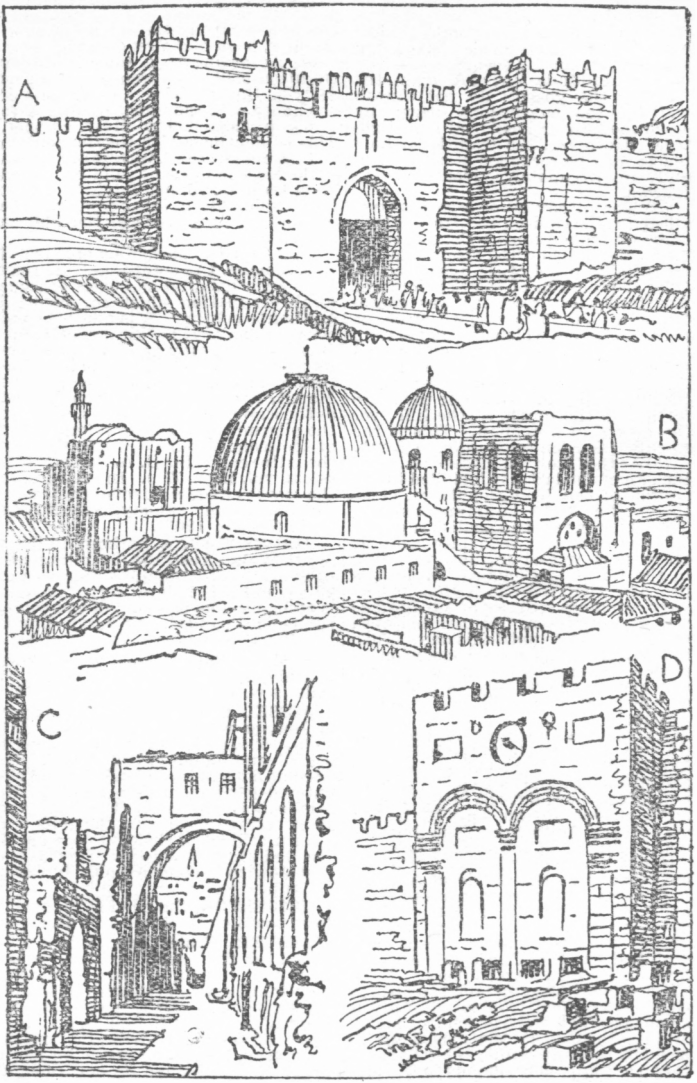
It continued thus depressed till the beginning of the fourth century, when, Rome having become Christian, Jerusalem shared in the benefit, and assumed the appearance of a distinguished Christian city, under the fostering care of Helena, mother of Constantine the Great. This period of prosperity, prolonged by a succession of Christian emperors, was suddenly terminated in 636, by the conquest of the Mahommedans, under the Arabian Caliph Omar.

In 1099 the Crusaders took Jerusalem by storm, and made it the capital of a Christian monarchy, which with difficulty maintained its existence till 1187, when it was finally overthrown by Saladin. In 1517 Jerusalem fell into the hands of the Turks, and remained a part of the Ottoman Empire till 1917. On 9th Dec., 1917, the city surrendered to the British forces under General Allenby. On 11th Dec., Allenby made his official entry into Jerusalem, and the British High Commissioner for Palestine now has his official residence there.

In 1918 a Hebrew university was founded on Mount Scopus, and the Jewish national life, in accordance with Mr. Balfour's declaration of 2nd Nov., 1917, has been revived. This university was formally opened by the Earl of Balfour in 1925. The Wailing Wall is sacred to the Jews and there was trouble about it between them and the Mahommedans in 1929. *See* ZIONISM.—BIBLIOGRAPHY: Sir G. A. Smith, *Jerusalem*; C. M. Watson, *The Story of Jerusalem*.

JERUSALEM, HOLY PLACES OF. The interest of Christians in identifying and visiting the spots consecrated by the presence of Jesus at Jerusalem did not awaken till the fourth century, when Helena, the mother of Constantine, the first Christian emperor of Rome, visited Palestine at the age of eighty in fulfilment of a vow. Her journey to Jerusalem evidently accelerated the custom of pilgrimage, and various scenes of our Lord's passion were identified more or less precariously.

Records of some eminent pilgrims have survived. From these, and from recent excavations, as well as from a critical study of the gospel narratives, attempts have been made to fix the site of certain events in connection with the last days of Jesus on earth.



JERUSALEM

A—Damascus Gate B—Roof Scene in Jerusalem C—Via Dolorosa D—17th Century Golden Gate

The difficulties are due to the stormy vicissitudes through which Jerusalem passed, especially during the Crusades; ecclesiastical interests also have often seized upon certain scenes, with little or no real foundation; and, again, the data of the gospels do not always warrant the conclusions drawn by some modern or mediæval investigators. However, the traditional holy places may be reckoned at about five, and approximately identified as follows.

(*a*) The discovery of a rock grave, alleged to have been the Holy Sepulchre, was made during Constantine's reign, and hailed with enthusiasm as a remarkable proof of the resurrection. Over it a church of the Sepulchre or Anastasis (Resurrection) was consecrated in 336. The vulgarities of the present church, which only dates from last century, have almost obliterated the original rock-tomb. Those who believe that this site originally lay inside the city wall prefer to locate the tomb farther to the north, at the hill over the grotto of Jeremiah. This is the so-called Garden (or Gordon's) Tomb.

(*b*) As the tomb was close to Calvary, the site of the latter is included in the church of the Holy Sepulchre, or at the knoll north of the Damascus gate. The latter has strong English support. Whether Calvary was really a hill at all is quite uncertain, however, and, in the words of Condor, "while it is probable that the site is that of Calvary, we must still say of our Lord as was said of Moses, 'No man knoweth of His sepulchre until this day.' This, indeed, is the general conclusion of recent writers, and even as regards Calvary we have only probabilities to consider" (*The City of Jerusalem*, p. 156).

(*c*) The Via Dolorosa, i.e. the route followed by Jesus from the judgment-hall of Pilate to the Cross, has been traditionally identified since the thirteenth century; but the identification is precarious, for not only is the site of Calvary quite uncertain, but the starting-point of the walk is obscure. All depends upon whether Jesus was condemned at the Castle of Antonia (as the traditional version assumes) or at Herod's palace; in the latter event, there could be only a few hundred yards to walk, unless Jesus was marched to the Castle of Antonia first, to join the two robbers.

"However, the actual roadway which those sacred feet trod so painfully is some yards below the present surface," and the thrill of associations is diminished by the uncertainty that the route taken actually corresponds to the present Via Dolorosa, which is "one of the most picturesque streets in the city, spanned as it is in parts by huge flying buttresses, passing up and down ancient stairways, and plunging through dark mysterious archways" (H. Rix, *Tent and Testament*, p. 205).

(*d*) According to a fourth-century tradition a little church was built as early as Hadrian's reign on the site of the house with the upper room, where Jesus instituted the Holy Supper. This is identified with the Cenaculum or Chamber of the Last Supper shown in the Moslem block of buildings called Nebi Daûd ('Prophet David'). But it is questionable if this room was the original meeting-place of the Church in Jerusalem.

(*e*) As for the garden or orchard of Gethsemane, the traditional site may have been fixed on the basis of some local information which survived till the fourth century. It is now held and conventionalized by the Franciscans. But "wherever it was—and the slopes have suffered much these nineteen centuries—any of the olive-groves on the Mount, which have not been dressed as the Franciscan garden has, will give the pilgrim a more natural impression of the scene of our Lord's agony than the latter can" (Sir G. A. Smith, *Jerusalem*, vol. ii, p. 571). In addition to the works cited, *see* Baedeker's *Palestine and Syria*; Sanday, *Sacred Sites of the Gospels* (1903).

JERVIS BAY, a harbour in New South Wales, Australia, 82 miles south of Sydney. A land and water area of 28 sq. miles is federal territory, and is to be used as the port of Canberra, the federal capital. At Jervis Bay is the Royal Australian Naval College.

JESI, or **IESI** (yā'sē), a walled town of Italy, in the province of Ancona, 17 miles S.W. of Ancona. Pop. 23,600.

JESSEL, Sir George, English lawyer. A Jew, he was born in London, 13th Feb., 1824, and educated at a Jewish school and London University. He became a barrister in 1847 and in 1868 entered parliament as a Liberal. He was solicitor-general, 1871–72 and then became master of the rolls and later president of the court of appeal. He died 21st Mar., 1883. He was the first Jew to become a judge in Great Britain.

JESSELTON, the chief town on the west coast of British North Borneo.

JESTER. Professional jesters, who depended for their livelihood upon their brains seem to have been common in all ages, although the Middle Ages witnessed the greatest development of the art of the buffoon. There were professional fools in ancient Greece, and Philip of Macedon had a court fool. Lucian in his *Banquet* gives an account of the jesters of a latter period. Among the Romans jesters were common.

The jesters of the ancient world were nearly all dwarfs or deformed in some manner. Martial (vi, 39) mentions one whose head went into a peak and who had long movable ears, and elsewhere he speaks of another who looked like Hector if one only saw his head, and like Astyanax when he stood up. A revolting feature about the practice of keeping jesters was that their deformity was sometimes caused by artificial means, such as keeping them confined in a sort of frame, so as to make their appearance more comical and consequently enhance their value.

In the Middle Ages every large establishment had its jester, and fools varied in degree, from the court fool to the jester of the smaller landed gentry. The jester had a regular uniform. His head was shaved, his coat was motley, very frequently red and yellow in colour, and the legs of his hose usually differed the one from the other in colour.

On his head was a special kind of cowl, fitted with bells and crested with a cockscomb. The fool's bauble, which he carried in his hand, was a short staff (like a sceptre or a field-marshal's baton) with a comical face on it; sometimes an inflated bladder was attached, and used for administering noisy but innocuous castigations.

Among celebrated English court jesters the following may be mentioned: Scogan, the jester of Edward IV; Will Somers, of the time of Henry VIII; Archie Armstrong, of the time of Charles I; and Muckle John, also of the time of Charles I, and probably the last official royal fool.

The last private jester on record was Dicky Pearce, who belonged to the household of the Earl of Suffolk. He died in 1728, and Swift wrote his epitaph. Some jesters seem really to have possessed a caustic wit, which was given complete freedom by their position; others seem to have been merely odd, and to have depended upon their eccentric appearance for much of their fun.

BIBLIOGRAPHY: John Doran, *The History of Court Fools*; Francis Douce, *Illustrations of Shakespeare*; E. K. Chambers, *The Mediæval Stage.*

JESMOND, district of Newcastle-upon-Tyne. Formerly a place of pilgrimage called Jesus Mount, it has still the remains of a pilgrimage chapel. Jesmond Dene is a public park.

JESSOP, Gilbert Laird, English cricketer. Born 19th May, 1874, he was educated at Beccles and Christ's College, Cambridge. He made his reputation as a member of the Gloucestershire county team, and was perhaps the hardest hitter of his day. He was also a good bowler and a grand fieldsman. He played for Cambridge University, in 1899 as captain, for England against Australia, and for the Gentlemen, and was the author of some sensational feats of rapid scoring. He succeeded W. G. Grace as captain of the Gloucestershire team.

JES'UITS, or **SOCIETY OF JESUS,** the most celebrated of all the Roman Catholic religious orders, founded in the sixteenth century by Ignatius Loyola, and established by a Papal Bull in 1540, the founder being the first *general* of the order. The members, in addition to the usual vows of poverty, chastity, and implicit obedience to their superiors, were bound by a fourth, viz. to go whithersoever the Pope should send them, as missionaries for the conversion of infidels and heretics, or for the service of the Church in any other way.

The Popes Paul III and Julius III, seeing what a support they might have in the Jesuits against the Reformation, granted to them privileges such as no body of men, in Church or State, had ever before obtained. They were permitted to enjoy all the rights of the mendicant and secular orders; to be exempt from all episcopal and civil jurisdiction and taxes, so that they acknowledged no authority but that of the Pope and the superiors of their order; to exercise every priestly function, parochial rights notwithstanding, among all classes of men, even during an interdict; and they could absolve from all sins and ecclesiastical penalties, dispense themselves from the observance of fasts and prohibition of meats, and even from the use of the breviary.

Their general was invested with unlimited power over the members, the dispersion of whom throughout society, with the most entire union and subordination, was made the basis of the order. The Constitution of the body was drawn up in great part by Loyola himself, but the second general, Laynez, had much to do in directing its early movements.

The order soon approved itself to the Pope by its zealous activity, and its success as the most effectual barrier against the growing power of Protestantism. The Jesuits carefully avoided all appearance of spiritual pride, often wore the ordinary garb of the country, and generally dealt with all matters in a spirit of worldly policy and accommodation to circumstances.

Their grand object was the establishment of the Papal power, not only against Protestantism, but against all the claims of kings and national Churches. In 1541 their foreign missions were begun by Francis Xavier in the Portuguese East Indies, and were attended with great success.

Other Jesuits went to South America, and laboured successfully in Brazil and Paraguay.

In Europe they became the teachers of the higher classes, and carried out, on a grand scale, improvements in the current system of instruction. The young nobility were almost exclusively sent to them, even from Protestant countries. It was in Catholic countries, however, that their strength lay; in England and the Protestant states of the north they were not so successful, their repeated attempts to establish themselves there proving fruitless.

Yet notwithstanding the great favour which they enjoyed at courts and among the people, the non-Jesuit clergy, the older order of monks, the universities, and the learned men of the age soon began to dread the powerful influence which the society was rapidly acquiring, while their busy intriguing spirit made them the objects of suspicion and jealousy to statesmen, on account of their interference in political affairs.

For this reason the Parliament and higher clergy of France for twenty years resolutely resisted the attempts of the Jesuits to gain a footing in that country. It was owing chiefly to the favour of the Guises that they at last, in 1562, were legally recognized in France under the name of *Fathers of the College of Clermont*, with a humiliating renunciation of their most important privileges.

They appeared in Germany about 1549, and soon secured chairs in the Universities of Prague, Ingolstadt, Cologne, Munich, Treves, Augsburg, and other places. They showed remarkable political talent in the Thirty Years' War; the league of the Catholics could do nothing without them. But while they were thus successful in this part of Europe, in France and the Netherlands the Jansenist controversy injured their position, and the character of the Jesuits received a wound from the pen of Pascal, whose famous *Provincial Letters* exposed with admirable wit and argument the dangerous element in their doctrines and practices, the accommodating morality which allowed interest and external circumstances to determine the rule of conduct, which counselled evasiveness and mental reservations, and consecrated evil means for a good end.

Towards the middle of the eighteenth century the general sense of danger from the Jesuits, and of the incompatibility of their privileges with the authority of the State and the rights of others, prompted a movement against them in various countries. In 1759 the efforts of the minister Pombal brought about their expulsion from Portugal, and the confiscation of their possessions in that country.

In France the commercial complications of a Jesuit trading-house at Martinique with some French merchants led to an inquiry which brought to light many abuses. Louis XV tried to save the society by demanding a reform of its Constitution, a demand refused by the general of the order, Lorenzo Ricci, in the famous terms, "*Sint ut sunt, aut non sint*" (Let them be as they are, or cease to be). The result was a decree issued in 1764 for the abolition of the order in all the French possessions.

Three years later they were expelled from Spain, and soon after from Naples, Parma, and Malta; and finally in 1773 Pope Clement XIV was induced to publish his famous Bull *Dominus ac Redemptor Noster*, by which the Society of Jesus was totally abolished in all the states of Christendom. They were obliged to quit their houses, lay aside the garb of the order, renounce all intercourse with one another, and either enter some of the other orders or put themselves under the superintendence of the bishops.

They received annuities from the revenues of their confiscated estates, except in Portugal, in which country they were prohibited from residing, as also in Spain; while in the States of the Church, in Upper Italy, and in Germany, Hungary, Poland, and even in France they were suffered to remain as private persons.

An attempt in 1787 to revive the society under the name of *Vicentines* was unsuccessful; but in 1814 Pius VII issued a Bull (*Sollicitudo omnium Ecclesiarum*) which re-established it in precisely the same form in which it had fallen. In 1815 a college was given them at Modena, and they did not delay to accept the invitations of the Kings of Sardinia, Naples, and Spain. Subsequently they found entrance into all European countries.

In Italy, since the establishment of the new kingdom in 1861, the Jesuits have no legal existence, but continue, nevertheless, an influential and well-known body. In Britain they have been permitted to open educational institutions, the principal of which are at Stonyhurst, near Preston, in Lancashire; Mount St. Mary's College, near Chesterfield, Derbyshire; Beaumont Lodge, near Windsor; and St. Benno's, at St. Asaph, in North Wales. In Ireland and in Scotland they have also several institutions. They have also colleges in the United States and in Canada. It was under the influence of this order that the Œcumenical Council of 1870 was held, and they have had a decided influence in shaping the recent policy of the Papal authorities.

By the law of the 4th of July, 1872, they were expelled from the German Empire, to the erection of which they had shown the utmost hostility. In 1880 they were expelled from their conventual establishments in France, and a considerable number of them came to Britain.—BIBLIOGRAPHY: J. Crétineau-Joly, *Histoire rêligieuse, politique, et littéraire de la Compagnie de Jésus* (English translation by B. N., *The Jesuits: their Foundation and History*); W. C. Cartwright, *The Jesuits: their Constitution and Teaching*; Stewart Rose, *Ignatius Loyola and the Early Jesuits*; G. B. Nicolini, *History of the Jesuits*; *Origin, Progress, Doctrines, and Designs*; Joseph M'Cabe, *Candid History of the Jesuits*.

JESUS. The name was in Greek the equivalent for 'Joshua'; indeed the great general of the Hebrews is actually called 'Jesus' by the English version of 1611 in *Heb.* iv, 8. It was not an uncommon name among the Jews, and we know of at least one early Christian who was called by this name, a companion of Paul ("Jesus, who is called Justus," *Col.* iv, 11).

But the name is pre-eminently associated with the Jesus who became the founder of the Christian religion. In His case the name was found specially appropriate. Literally it meant 'Jehovah saves,' and Jesus, according to one story (*Matt.* i, 21), was so called by a divine prompting, as He was to save His people from their sins.'

The date of His birth is uncertain, but it may have been between 6 and 4 B.C. His parents, Joseph and Mary, belonged to the lower division of the province of Galilee, to the north of Palestine, farther from Judea than Samaria was, yet closer in faith and blood; for although the orthodox Jews of Jerusalem and the south might look down upon the accent and the mixed racial qualities of the Galileans, and suspect their strictness in religion, the Galileans were true to the law, and often proved themselves passionately devoted to the interests of Judaism, particularly when these took the form of a Messianic crusade. Certainly the parents of Jesus went regularly to Jerusalem to attend the annual spring celebration of the passover. It was a religious household in which Jesus was brought up, with an atmosphere permeated by the best traditions of Jewish piety.

The home of His parents was at the hamlet of Nazareth, on the slope of a high valley facing the north side of the Carmel range, and almost half-way between the Mediterranean and the Lake of Galilee. There Jesus received the ordinary education of a country boy at the school connected with the local synagogue. He was trained to Joseph's trade, that of a carpenter or builder. His parents were of humble origin; Jesus was the eldest child, but there was a large family of sons and daughters. Joseph seems to have died early. The sisters were married in the neighbourhood, but Jesus never married. Till he was over thirty He remained unknown beyond His district, working at His trade.

Echoes of the great outside world must have reached Him, for Galilee was busy with trade and commerce, but He made no effort to study as a rabbi or to abandon His provincial life for a career elsewhere. He may have known some Greek, but His language was Aramaic, the vernacular dialect of Galilee. So the first phase of His life passed.

Until about A.D. 27 nothing was heard of Jesus outside the hamlet and district of Nazareth. Then news reached the locality of a revival movement in the far south. Judæa was being roused by the vigorous preaching of a priest's son called John. He had the prophetical gift of an Amos or a Micah, and the religious awakening which followed his mission drew people of all classes and from many quarters.

Among them some Galileans hurried down to the banks of the Jordan, where John was accustomed to insist upon his converts dipping themselves in the river as a symbol of the clean life to which they had committed themselves. The summons was for a radical, practical repentance, in view of an imminent judgment of God.

John denounced the sins and shortcomings of his age, like a Savonarola. His demand upon the conscience of his hearers roused some fishermen from the Lake of Galilee and Jesus Himself, who underwent a deep religious experience of His own when He was immersed at the Jordan. He now became fully conscious of a divine mission to His age and nation, larger than that of any revival preacher. He believed He was the Son of God, with a Messianic vocation. A period of meditation followed, in which He thought out His position and determined His course. Then He returned to Galilee.

Meantime, John was arrested by Herod Antipas, the tetrarch of Galilee, who presently put the audacious prophet to death. The revival movement of John was thus checked, although some of his adherents still clung together. But it was replaced and enlarged by the movement which Jesus now started in the north. He came forward with an ampler message and mission. Unlike John, He was not an ascetic. He moved freely among all sorts of people, and denunciation was not the staple of His teaching.

He began by attaching to Himself four of the fishermen from Galilee who had already been influenced by John. These men He summoned to accompany Him in a new enterprise, a mission of teaching and healing in the district round Capernaum. His headquarters were at the house of Simon Peter, the most prominent of the four, and the range of His mission covered the adjoining villages and townships.

The success of the mission was at first remarkable. The countryside thrilled to His appeal, and apparently the reputation He won reached even Jerusalem. Eventually He added eight to the original four personal companions of His fellowship, and sent them out on a mission of their own to carry the good news of God throughout the province.

This was the hey-day of His popularity. He made religion simple and real. His personality won devotion to Himself and to His cause. His religious genius, His new message of God the Father, His power of teaching, and the enormous impression made by His cures—for He travelled about as a *hakeem* or healer as well as a teacher—all this made a deep and sharp impression for a while.

Presently, however, the popularity waned. The authorities became suspicious of His attitude to the strict regulations of Jewish piety; for although Jesus confined His mission to Jews and upheld the law and the prophets, He was indifferent to the ceremonial and ritual regulations which had grown up around the faith. He openly repudiated the hard interpretation of the Sabbath, for example, and criticized freely the traditional regulations and rules which the authorities identified with true religion.

This generous attitude did not lessen His popularity with the masses, it is true, but many of them began to realize the strenuousness of His ethical demands. His fervour even led some, including His mother and family, to regard Him as insane. Also, the murder of John by Herod indicated that, although Jesus abstained from any political preaching, the tetrarch might take similar measures on behalf of the authorities against this unflinching Prophet of Galilee.

Jesus, therefore, withdrew for a time to the north. Except for this hurried retreat, He never left Jewish soil during His life. But a critical moment had arrived, and during this period of wandering He resolved to alter His method. Hitherto He had in the main confined Himself to the northern Galilee. Now He determined to make a final appeal to the nation at head-quarters and to enter Jerusalem, convinced that only by thus risking His life and enduring suffering for the cause could He accomplish the regenerating work of God. Probably this was about A.D. 29.

He disclosed to the inner circle of His followers the secret conviction of His soul that He was the divine Messiah, and that as such He must encounter death for the sake of the cause of God. Indeed His main attention at this point is given to the disciples, whom He endeavoured to train for the future work that will await them, and to prepare for the coming tragic fate that will befall Him. He endeavours to assure them that the hope and future of the cause are safe with God, and that death will not interrupt His power and presence with them.

He entered Jerusalem as the spring celebration of the passover was due. Scenes of enthusiasm occurred. The Galileans cheered their Prophet into the holy city. But the authorities were suspicious and alert. Jesus challenged them boldly. His answers and questions were damaging to their authority, and they feared a Messianic rising, which would compromise them with the Romans.

One of His disciples for some reason was willing to betray Him into the hands of the Jewish rulers. Late one evening He was arrested in a garden near the city, hurriedly tried, and condemned by the Jewish council upon a charge of blasphemy, and then brought before the Roman Governor to have the sentence ratified.

The Governor was induced against his will to let the malignant Jews have their way, the reason being that Jesus was a dangerous political agitator. As such, as a leader of revolt, He was formally sentenced to death, and at once crucified along with a couple of brigands. The execution took place upon a Friday. By the following Sabbath His body had disappeared from the tomb in which some of His adherents had been allowed as a favour to deposit it.

The Jews alleged that it had been removed by His adherents themselves. The latter maintained that Jesus had returned from the dead, resumed His body, and appeared to several of them in supernatural form. This belief spread among His adherents, and out of their faith the Christian community arose.

Such, in bare historical outline, is a summary of the outward career of Jesus upon earth. He wrote nothing Himself. All that is known about Him has come down from recollections preserved by the tenacious Oriental memories of His followers. These are recorded in four small books of 'Gos-

pels,' which contain the Christian interpretation of His career and character. Little else has survived of any historical importance, and even the contents of the four Gospels are not always 'historical' in the strict modern sense of the term. They were written for those who already believed, to train them in the religion which Jesus had founded, to show how that religion differed from Judaism, and to expound its essential principles in the very words of the Master Himself.

What was fundamental was the belief that Jesus had been the Son of God, not an ordinary man, but divine; not even the traditional Jewish Messiah, but one who fulfilled that rôle as the Son of God through suffering and death, bringing to the world life eternal and a final revelation of God. This belief was expressed in various ways. Some thought that He was born of Mary before her marriage was consummated, and beautiful tales were told about His childhood. He was further credited with supernatural powers over nature and disease, which extended occasionally to raising dead persons. Also, His own death was marked by extraordinary phenomena. It is one problem of historical criticism to explain the origin and meaning of such traditions. But the substantial historicity of the records is no longer to be doubted.

The production of such a picture as the sketch of the personality and teaching of Jesus in the Gospels is incredible as the mere outcome of pious reverence or of the mythopoetic faculty. Even after fair allowance is made for the idealizing tendencies of devotion, and for the difference between various strata of the tradition in point of historical probability, the fact remains that the early Christian movement is unintelligible apart from some such historical mission of Jesus as the Gospels reflect.

Reverence has entered naturally into the retrospect now and then; later reflection has heightened occasionally the original record and intensified the colouring of the supernatural. But the description of what Jesus did and of what He was is not the result of a vague effort upon the part of enthusiasts to deify a noble Prophet who had been prematurely put to death.

The Gospels are far from complete, judged by the standards of biography. Long spaces of the life are passed over. The only week of which we have any detailed knowledge is the last week of His life. "On the very shortest estimate length of the ministry must have extended to about 400 days, and I doubt if our Gospels contain stories from 40 separate days. So that nine-tenths at least of the public life of Jesus remains to us a blank, even if we were to take every recorded incident as historical and accurately reported. And all the recorded sayings of Christ, how long would they take to pronounce? With due gravity and emphasis they might take six hours—hardly, perhaps, so much" (Burkitt, *Transmission of the Gospels*, p. 20). But the materials, although scanty and fragmentary, yield what is salient and characteristic.

The precise limits of the supernatural in His personality and career form an unsolved, probably an insoluble, problem. But that Jesus actually lived, that He believed Himself to be sent into the world for a unique divine vocation, that He was conscious of being in some sense God's Son as no one else could be, and that He did appear after death to His disciples, not as a ghost and still less as one who was merely resuscitated—this is certain, as certain as anything which rests upon human testimony can be.

—BIBLIOGRAPHY: From the vast literature upon the teaching, miracles, self-consciousness, and environment of Jesus, it is only possible to select here a handful of references to works describing more or less fully His actual life, (*a*) the best being Keim's *Jesus of Nazara*, with (on a smaller scale) Renan's *Vie de Jésus*, Oscar Holtzmann's *Life of Jesus*, Edersheim's *Life and Times of Jesus the Messiah*, S. J. Andrews's *Life of Our Lord*, Seeley's *Ecce Homo*, Bousset's *Jesus*, Sanday's *Outlines of the Life of Christ*, P. Didon's *Jesus Christ*, G. H. Gilbert's *Student's Life of Jesus*, and J. Stalker's *Life of Jesus Christ*; (*b*) some works describing recent discussion, like Schweitzer's *Quest of the Historical Jesus*, Sanday's *Life of Christ in Recent Research*, and Weinel and Widgery's *Jesus in the Nineteenth Century and After*; with (*c*) a few books upon special features, such as Bruce's *Training of the Twelve*, Loisy's *Jésus et la Tradition évangélique*, Denney's *Jesus and the Gospel*, Batiffol's *Credibility of the Gospels*, S. J. Case's *Historicity of Jesus*, E. F. Scott's *Kingdom and Messiah*, and T. R. Glover's *Jesus of History*.

JESUS COLLEGE, Cambridge, was founded by Alcock, Bishop of Ely, in 1496. Its site was previously occupied by the Benedictine nunnery of St. Radigund, and parts of the old nunnery still remain, including the church, which has been converted into the usual form of college chapel. Among many famous men educated at this college may be mentioned Cranmer, Sterne, and Coleridge.

JESUS COLLEGE, Oxford, was founded by Queen Elizabeth in 1571. Many of the fellowships and scholarships are confined to persons born or educated in Wales. The college is thus distinctively the Welsh one. This was the first college founded on Protestant principles. The Earl of Pembroke is the hereditary visitor of the college.

JET, a hydrocarbon compound allied to Cannel Coal, and found chiefly in beds of Upper Lias shale at Whitby, in Yorkshire. Like amber, it becomes negatively electric by friction and takes on an excellent polish. At an early period it was given, like amber, a magico-religious value. Bede says that when heated jet drives

Gate at Jesus College

away serpents. Until comparatively recently jet was in Scotland dipped in water to effect magical cures.

Siret has found British jet associated with Baltic amber and Egyptian and Babylonian artifacts among the relics of the Eastern colonists who settled in Southern Spain long before the introduction of bronze working in Western Europe.

In South-Western England jet and amber are associated with the Egyptian blue beads of the Empire period (*c.* 1300 B.C.) identified as such by Professor Sayce and Dr. H. R. Hall. There are a number of jet ornaments in the British Museum among the Bronze and Iron Age antiquities, one of the most beautiful being a necklace from Melfort, Argyllshire.

JETHOU, one of the Channel Islands. It is administered from Guernsey.

JETSAM, or **JETTISON** (A.-Fr. *jetteson*; Lat. *jactare*, to cast), goods found at sea after shipwreck, under water and unsecured. According to Lord Coke, jetsam is "when a ship is in danger of being sunk and, to lighten the ship, the goods are cast into the sea, and afterwards, notwithstanding, the ship perishes."

When the ship is lost and the goods float, it is 'flotsam' (O.Fr. *floter*, to float); when they are cast into the sea and sink, but have been secured by a buoy or cork to facilitate their recovery, it is 'ligan' (Lat. *ligamen*, a band). All such goods fall to the Crown, but are returned to the owners if claimed within a year.

JETTY, PIER, and **MOLE,** terms employed to denote any structure which projects abruptly from a landline into the water.

A 'mole' is generally understood to be of the nature of a breakwater, but strictly speaking it may be considered a mole only when it is provided with a quay on the sheltered side.

A 'pier' conveys the idea of carrying a load, or affording a convenient platform for transferring passengers and merchandize from ship to shore, or vice versa. Both moles and piers of these types are frequently called jetties.

'Jetties' are also to be found projecting from the sides of docks. They must be of sufficient width to accommodate the railways, cranes, and sheds required for handling cargo. By their use the quayage and the dock accommodation are increased. Good examples are to be found at Marseilles, in the Thames at Tilbury and Victoria Docks, in the Clyde, and at the Alexandra Dock, Hull.

Another use for jetties is illustrated at the mouth of the Mississippi and at Tampico, where parallel jetties are formed constricting the exits of the rivers and so concentrating the volume of flow as to clear away obstructions in the navigation channels. Parallel jetties are also constructed at Ostend, Dunkirk, Calais, and elsewhere to concentrate the scouring action of the tides.

The jetties at Tampico and the Mississippi are constructed of mounds of rubble in layers interspersed with fascine or brushwood mattresses, and are surmounted by a crest-wall of concrete. Those at Ostend and Dunkirk are formed of low mounds with pitched surfaces rising only a few feet above beach-level, and are surmounted by a timber framework supporting platforms, at the outer ends of which are the guiding lights for the harbour entrance.

Jetties are also used at entrances to docks from estuaries and rivers. In this type they widen out towards the river, and afford protection from the

current. Tilbury tidal-basin is provided with such jetties.

When jetties are built as piers on a more or less exposed coast, they are usually made of open framework, and the deck or platform is of such height above water-level as to allow the waves to expend themselves through and underneath the structure. They are therefore not exposed to the full wave force, whereas a jetty of solid construction would present its whole area to the wave-stroke, and would consequently be very costly to build.

The force of waves was measured at Dunbar by wave dynamometer and found to be as much as 3¼ tons per square foot. Jetties of solid construction have also the disadvantage of blocking access along a beach, and trapping the littoral drift, causing the ultimate silting up of one side of the jetty.

Piers of the open-framed type may be constructed entirely of timber, but are frequently made with cast-iron piles supporting steel girders or timber beams on which the platform is carried, all being strongly framed together. Reinforced concrete is used, and if well constructed the steel reinforcement should be protected by the concrete, as any exposed steel or iron will corrode in sea-water.

The jetty or mole at Zeebrugge is a good example of the solid type—in this case formed with arches over the beach.—BIBLIOGRAPHY: Brysson Cunningham, *Dock Engineering*; *Harbour Engineering*; Colson, *Dock Construction*.

JEV'ONS, William Stanley, an English writer on logic and political economy, born at Liverpool in 1835, died in 1882. He was educated at University College, London; held an appointment in the Royal Mint in Australia from 1854 to 1859; graduated at London University in 1862; was appointed professor of logic, mental and moral philosophy, and Cobden lecturer on political economy in Owens College, Manchester, afterwards professor of political economy in University College, London, a post which he resigned in 1881.

Amongst his works are: *Elementary Treatise on Logic* (1870), *Theory of Political Economy* (1871), *Principles of Science* (1874), and many essays and addresses on economic questions. Those entitled *The Coal Question*, *The Value of Gold, Money*, and *The Mechanism of Exchange* may be specially mentioned. He was drowned while bathing near Hastings.

JEW, THE WANDERING, a legendary personage regarding whom there are several traditions. One of the most common is that he was a cobbler in Jerusalem by name Ahasuerus, at whose house Jesus, overcome with the weight of the cross, stopped to rest, but who drove Him away with curses. Jesus is said to have replied: "Truly, I go away and that quickly; but tarry thou till I come." Since then, driven by fear and remorse, the Jew has wandered, according to the command of the Lord, from place to place, and has never yet been able to find a grave.

The legend has been made use of by Shelley and is embodied in a romance by Eugene Sue, and a play by Mr. Temple Thurston.—Cf. S. Baring-Gould, *Curious Myths of the Middle Ages*.

JEWEL, John, Bishop of Salisbury, born in 1522, died 1571. He was educated at Oxford, embraced the principles of the Reformation, and contributed greatly both by his work as a college tutor and by his sermons and writings to the progress of Protestantism. On the accession of Mary he at first temporized to avoid persecution, but finally in 1554 escaped to Frankfort. On the accession of Elizabeth in 1558 he returned to England, took part in all the measures for the thorough establishment of Protestantism, and became Bishop of Salisbury in 1560. He is famous for his many controversial writings, amongst which his *Apologia Ecclesiæ Anglicanæ* (Defence of the Church of England), 1562, written in Latin, is notable.

JEWELLERY. Personal adornment is a characteristic of all savage races, and probably preceded clothing. Necklaces were most likely the earliest objects of personal ornamentation worn by mankind, and indeed the earliest known human skeletons, found in a cave near Mentone in 1884, being the remains of a man, a woman, and a child, all wore bits of necklaces of carved bones, vertebræ, and pierced teeth. Another early form of decoration was a head-dress of feathers of some particular kind, and this, made up in a special way, frequently denoted chieftainship.

For necklaces and armlets or headcirclets it was always easy to thread berries, small eggs, or shells: and such objects abound in all collections of primitive ornaments. All these were merely the harbingers of modern jewellery, which may be defined as consisting of beautifully wrought metalwork enriched with precious stones and enamels.

The earliest metal worked by mankind was probably gold, because that metal occurs in a visible form either as dust or in nuggets, so that it is

easily found and easily worked in a simple way by hammering or piercing. Strings of small gold nuggets pierced and strung together have been found in Rhodesia. Both in Egypt and in Greece the making and use of gold wire was apparently known at a very early period, and was probably made by hammering, as drawplates were certainly unknown.

Ancient Jewellery. The most ancient jewellery yet known was found by Dr. Flinders Petrie, and is supposed to be some five thousand years old. It was found in the ruins of a pyramid of Senusert II, King of Egypt, and among the most remarkable of the objects were an ex-

Old English Fibulæ. The upper one is of gilt bronze and was found at Fairford, Gloucestershire. The lower one was found at Abingdon and is encrusted with garnet-coloured glass on a ground of gold foil, plate, and wire. The bosses are of ivory or bone.

quisite pectoral and a coronet. All the workmanship is of the highest excellence as regards technical skill and design.

About 300 B.C. the curious 'solid' necklaces known as torcs were largely made in Europe; they were made of gold, silver, or copper, and varied much in size. In a very small size they seem to have been used as ring money. Bracelets of a similar construction, with enlarged ends, were made in Scythia. Two specimens of this work, the ends representing figures of horned monsters, are to be seen in London, one at the British Museum and the other at the Victoria and Albert Museum. In both cases the monsters show elaborate *cloisonné* work, and were no doubt originally finished with inlays of cut stones.

Very delicate gold work, *granulated work*, reached its highest development about 600 B.C., when the Etruscans made beautiful brooches, bracelets, ear-rings, necklaces, and diadems, ornamented with grains of gold in the most astonishingly minute way. Jewels are rarely found in this work, but small opaque enamels were sometimes used.

Greek jewellers of early times were also notable goldsmiths, and their designs and methods of work have much in common with the Etruscan. Much fine Greek work has been found in the Crimea, and was preserved in the Hermitage Museum at St. Petersburg (Leningrad).

Stone-cutting. Except in India, precious stones do not appear to have been faceted until recent times, and all early jewels are either polished on their natural irregular surfaces, as is the Great Ruby in the State crown of England, or else rounded and polished in the manner known as *cabochon*. The cutting of stones in facets probably began with the diamond, as it was found easier to rub two diamonds together, to produce a facet on each one, than it was to cut and polish them in a rounded form. Even irregular facetting, however, was sufficient to give effect to the peculiar refractive power of the stone, and in due time the problem of arranging the facets received careful scientific investigation, when the true brilliant form was ultimately arrived at.

In France, about the middle of the seventeenth century, Cardinal Mazarin took much interest in the question of diamond-cutting, and he had twelve fine stones cut, under his own supervision, for insertion in the crown of France. They were called the *Twelve Mazarins*, and were cut in what is now known as the *rose* form, that is to say, with a broad flat base and only faceted at the top.

A true *rose* cut diamond is supposed to have twenty-four facets, but actually it depends much upon its size. A natural octahedral crystal of diamond would make two *roses*, as it would be split in two across its widest diameter. A brilliant, however, is based upon the complete form of a natural crystal of diamond, which resembles two pyramids joined at their bases.

The design of the cutting is said to have been introduced by Vincenzo Peruzzi, a Venetian lapidary, towards the end of the seventeenth century; it should show thirty-two facets above the girdle, and twenty-four below, but in small brilliants there would naturally be fewer. A well-shaped brilliant should be almost equally deep both above and below the girdle, but most very large diamonds are altogether too flat.

Paste. 'Paste' is a potash glass containing a large proportion of oxide of lead, and it refracts white light into its component colour rays almost as

strongly as diamond. Its power of refraction depends largely upon the sharpness of the edges of the facets into which it is cut, and when their sharpness is worn off, the jewel loses its early brilliancy. Paste jewellery was very popular both in England and in France in the eighteenth and nineteenth centuries, and is still very extensively used.

Many of the older paste jewels are charmingly set, and if in good condition, they are highly esteemed. They are usually backed with silver foil, which is apt to become discoloured. Coloured stones, rubies, emeralds, and sapphires particularly, are often faceted, but it is doubtful whether they gain anything by the process; indeed, it is often considered that they look better when cut in the rounded *cabochon* form.

Pearls. Pearls have always enjoyed a great and deserved popularity; they are composed of carbonate of lime, and do not last well. They are found in the shells of several shell-fish, chiefly in that of the pearl oyster, *Meleagrina margaritifera*, found mostly near Ceylon.

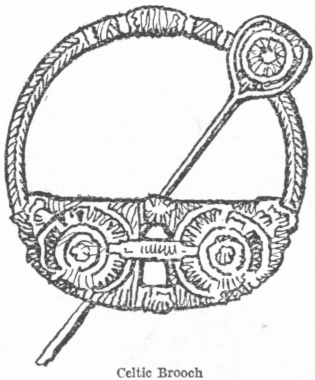
Pearls are caused by small objects getting into the shell. These objects may get in accidentally, or may be purposely inserted; the oyster covers them over with nacre so as to avoid discomfort. Small pieces of lead have been put into oyster shells for a very long period, and when covered with nacre, they have been cut out and used as charms.

Metal Pins. At first garments were probably held together by thorns or by small bones of animals or fish, used as pins, but as the working of metals became gradually known, metal pins were made in quantities. The heads of metal pins developed into ornamental forms, until in early Scandinavian, Irish, and Anglo-Saxon work a beautiful series of 'pen-annular' brooches are to be found, the finest examples of which are perhaps the *Tara brooch*, the *Ardagh brooch*, or the *Hunterston brooch*, all having long pins and highly ornamental heads. But these long sharp pins must have been uncomfortable to wear, so some ingenious savage thought of bending them in half and of making loops in the blunt ends to catch over the sharp points. In this way the safety-pin of the present day was evolved. Some specimens of it have been found among the ruins of Troy.

In Greece and Rome many curious developments of the upper part, or bow, of fibulæ have been constantly found. The ornamentation of the bow of a fibula has, since that time, developed in many directions, becoming, in fact, the ordinary brooch of to-day with a quite short pin. Fine instances of this form may be found in the splendid Scottish brooches, the Brooch of Lorn or the Lochbuy brooch.

Diadems and Crowns. Diadems and crowns have a very long and interesting history, from a remote period when chieftains of savage tribes or clans wore some form of head-dress to indicate their rank. At Mycenæ Dr. Schliemann found several thin gold diadems with simple designs punched or impressed upon them, and others of fine workmanship have been found in the Crimea.

Among European crowns the finest are the beautiful Byzantine crown of



Celtic Brooch

Hungary, rich in enamels and cabochon jewels; the crown of Charlemagne, with splendid enamels, pearls, and cabochon stones; and the curious crown of Lombardy, enamelled and jewelled, enclosing a plain iron circlet, said to have been made from the nails that nailed Christ to the cross. The crown of Russia, of modern make, was in form like a mitre, and closely covered with fine diamonds, with one large ruby quite at the top. The State crown of England, made for Queen Victoria, is also a mass of diamonds. In front is one of the larger brilliants cut from the Cullinan diamond, and just above it is the Great Ruby, polished on its natural irregular surface. This stone was given to the Black Prince by Pedro the Cruel in 1367. At the back is a large pierced sapphire given to George IV by Cardinal York, and in the centre of the cross at the top is a fine sapphire, now cut in facets, which is said to have been taken from the ring of Edward the Confessor in his shrine at Westminster.

Rings. Rings are rarely found among the primitive ornaments of

prehistoric races, probably because finger-rings interfere with the free use of a working hand. The important part, however, that finger-rings have played in civilized times largely compensates for their neglect among early nations. Egyptian scarabs, perhaps most usually worn on a band round the arm, were certainly often worn as rings, and set on a swivel, with the flat side next the finger; they served as seal-rings.

In Anglo-Saxon times very fine rings were made of gold, run in with niello, an amalgam of silver, copper, and lead. The finest known example of this remarkable work is to be found in the ring of Ethelwulf, who reigned in the ninth century, and was the father of Alfred the Great. It is now in the British Museum.

Among the Greeks and the Romans rings of gold and other metals set with jewels or pastes were very popular, and in Rome sumptuary laws were made about the wearing of them. In the first century gold rings were only allowed to Patricians, and even they had to show a property qualification. Freedmen were allowed silver rings, but slaves might only wear iron. The inferior rings were sometimes covered with gold foil so as to look like those of Patricians, and these frauds are known as 'Samothracian' rings. They sometimes consist of only a mastic core covered with thin gold.

In the Middle Ages Papal rings were of much interest. These were often very large, and were frequently fitted with small receptacles for fragments of holy relics. They were sometimes worn on the thumb and sometimes over a glove. Decade rings, also known as penance, rosary, or dicket rings, have ten small projections round the hoop and a larger boss as bezel, sometimes engraved with a cross or a crucifix. They were particularly liked by sailors.

In the sixteenth century Italian poison-rings were much in use. They had a small hollow under the bezel, in which was hidden a drop or small piece of strong poison for the owner's use in any emergency. Another form of poison-ring was aggressive, and so made that the owner could easily pierce an enemy's hand with the point of a poisoned needle. Cæsar Borgia is said to have possessed, and used, one of these murderous jewels.

Writing-rings were set with a sharp diamond point, and were at one time popular for writing upon glass windows. With one of these rings Francis I wrote his celebrated couplet on a window at the castle, at Chambord:

> Souvent femme varie
> Mal habil qui s'y fie.

Minute watches have often been set in rings, and not very long ago plain gold rings with mottoes engraved inside them were quite common; they were known as posy rings. Some of the posies are charming and always quite short, e.g.

> The Love is true that I O U.
> Let us Love like Turtle Dove.

Other rings were set with precious stones so that the initial letters of the names of the stones should spell a name or sentiment, e.g.

Ruby.	Lapis Lazuli.
Emerald.	Opal.
Garnet.	Verde Antique.
Amethyst.	Emerald.
Ruby.	Marcasite.
Diamond.	Emerald

Memorial rings form a very large class. They are generally of gold, engraved and run in with black enamel, and the bezels, which are often quite large, frequently show devices cleverly worked out in pieces of the hair of the deceased, sometimes finished with minute seed pearls. Portrait-rings with engraved stones or miniatures are still much valued; the head of Charles I is perhaps the one most commonly met with.

At the present time there is no doubt that the prevalence of machine work in jewellery has, by reason of its cheapness, largely discounted the charm of work by hand, although hand work has recently been somewhat revived on account of the beautiful work done in England by lady jewellers, of whom many are amateurs.

A new and charming rebirth of fine jewellery in every form was fostered in France by René Lalique and his school at the beginning of the twentieth century. It was remarkable for learned and charming design, as well as masterly and delicate skill in technical matters. One of its outstanding merits was the large use of non-precious materials, such as horn, shell, coral, malachite, jet, and crystal. To-day, however, jewellery designing is distinguished by geometric and abstract features and the blending of many different kinds of coloured stones, which are cut in a variety of shapes.—BIBLIOGRAPHY: A. Castellain, *A Memoir on the Jewellery of the Ancients*; C. Davenport, *Cantor Lectures on Jewellery*; *Jewellery*; *Crown Jewels of England*; Sir J. Evans, *Posy Rings*; W. Jones, *Finger Ring Lore*; C. W. King, *Antique Gems*; H. C. Smith, *Jewellery*.

JEWS, a Semitic race of people also known as Hebrews and Israelites, and whose early history is identified with that of Palestine or the Holy Land.

The term Jew has three implications, viz., racial, national, and religious. Much can be said in favour of each of these conceptions. On the one hand, it must be admitted that the majority of Jews belong to one race, whilst, on the other, it cannot be denied that many proselytes have embraced Judaism and thus become Jews. For the prophets of old, as indeed for all Semites, the unifying element was religion, common worship rather than consanguinity, or kinship of language and blood. As opposed to this view many modern Zionists are of opinion that the Jews' form a nation, and that Jewish nationality is independent of religion. (*See* PALESTINE; ZIONISM.)

Although the history of the Jewish people is inseparable, at least until the advent of Zionism, from the Jewish religion, we shall deal in the present article only with the history of the Jews, from its beginnings down to modern times. The creed and worship of the Jews and its developments will be treated in the article ZIONISM. We shall divide Jewish history into two periods: (1) early history, from the migration of Abraham from Mesopotamia to Canaan to the destruction of Jerusalem; and (2) modern history, or that from the Dispersion down to the fall of Jerusalem in Dec., 1917.

1. Early Jewish History. The main authority for the early history of this people is the Old Testament. But the chronology is obscure and difficult to harmonize. Jewish history may be considered as beginning with the emigration of the patriarch Abraham, ancestor of the race, from Ur of the Chaldees, probably about 2,000 B.C. Abraham removed to the south-east of Palestine, where we find his descendants flourishing when they were led to emigrate to Goshen, in Egypt.

The interval is filled up with the history of the patriarchs Abraham, Isaac, and Jacob (q.v.). Joseph, a son of Jacob, had become Viceroy of Egypt, and his father and brothers were received with high favour by the Pharaoh who then ruled in this country. But in course of time the condition of the Israelites, under the rule of the Pharaohs, changed for the worse. They were treated as bondmen and forced labour was exacted of them in an unreasonable degree. According to some authorities, the Pharaoh who began to oppress the Israelites was Rameses II, and their deliverance took place under his son.

It was perhaps about 1320 B.C., others say 1491 B.C., that a deliverer in the person of Moses led the Israelites out of the land of bondage, where they had resided for some 400 years. By this time they formed a community of several millions, divided into twelve tribes, named respectively after Reuben, Simeon, Judah, Issachar, Zebulun, Benjamin, Dan, Naphtali, Gad, and Asher, sons of Jacob, and Manasseh and Ephraim, sons of Joseph. Under Moses' leadership they went forth into the wilderness; through him they received the law of the ten commandments on Mount Sinai, and the whole polity by which they were to be governed as a people. A ceremonial of sacrifice was instituted, and Aaron, the elder brother of Moses, and his sons consecrated as a hereditary priesthood, the priestly functions thus falling to the tribe of Levi. The nation was established as a theocracy, and this principle, however often forgotten in times of repose, continued henceforward to be the inspiring idea of national unity throughout the frequent crises of Jewish history.

The emigrants first settled at Kadesh, on the southern borders of Palestine, where they remained for many years, this being the period spoken of in the Scriptures as the forty years' wandering in the wilderness. They now marched northward to find new settlements in Palestine, which they had to wrest by force from the Canaanites.

Moses died before entering the promised land, and was succeeded as leader by Joshua, under whom the Israelites advanced to the conquest of the territories of the Canaanites west of Jordan. The former inhabitants, however, were not entirely subjugated, but retained possession of a number of cities, and the twelve tribes settled in districts which were more or less cut off from one another, and which formed an exceedingly loose union of small states under tribal chiefs, at times hard pressed by neighbouring peoples.

It was only long after, and by a gradual process of absorption, that the Canaanite territories and their inhabitants became amalgamated with the Israelites.

After the death of Joshua, about 1220, or according to another chronology 1427 B.C., a succession of judges or military leaders arose. Among the more remarkable of these judges were Barak, Deborah the prophetess, Gideon, Jephthah, Samson, and Samuel.

About 1070 the Philistines, who inhabited the coast and the low-lying plains west of the mountains of Judah, had defeated the Israelites and subjugated part of the country when Samuel, the 'last judge in Israel,' was inspired to declare to Saul, a Benjamite, his destiny to become king,

and anointed him as such. Saul soon proved his fitness for the post by his successful leadership of the Israelites, and he continued to organize the forces of Israel, and to fight with varying success against their enemies till his disastrous defeat and death at Mount Gilboa, after which the power of the Philistines again predominated on the west side of Jordan.

On the other side of the river the military skill of Abner still preserved a kingdom for Saul's son, Ishbosheth, and gradually reasserted with some success his authority in Ephraim and Benjamin. But in Judah, David, a native of Bethlehem, a warrior whom Saul's jealousy had driven into exile and alliance with the Philistines, and who had previously been anointed king in place of Saul, established a separate principality, the capital of which was at Hebron. For seven years a fierce war was waged between the two Hebrew states, and ended only with the murder of Abner and Ishbosheth, when all the tribes acknowledged David as king. David now transferred his residence from Hebron to Jebus, a fortified city which he wrested from the Canaanites, and called the City of David, afterwards Jerusalem. He assailed and subdued the Philistines, Moabites, Edomites, Ammonites, and other surrounding nations, till all the country from the north-east end of the Red Sea to Damascus acknowledged his authority.

To this prosperous kingdom succeeded his son Solomon (993 B.C., or by the long chronology 1015). His reign, owing to the warlike reputation which the nation had acquired under David, was entirely peaceful. He had no military tendencies, but he took great pains to arrange the administration of the kingdom in an orderly way, and his wisdom as a ruler and judge became proverbial. His alliances with Tyre and Egypt enabled him to carry on an extensive and lucrative commerce. He built the celebrated temple in Jerusalem, and extended and improved the city. His harem contained 700 wives that were princesses, besides 300 concubines. But with these, and with the extended commerce of the kingdom, it was inevitable that foreign elements should be introduced into the Jewish national life. Thus Solomon erected altars for the deities and the worship of the Moabites, the Ammonites, the Sidonians, and other nations; and the severe simplicity of old Hebrew manners gave place to luxury and craft.

The splendour of Solomon's reign had entailed heavy exactions upon his people. When Rehoboam, Solomon's son, succeeded, they came with Jeroboam at their head and demanded that he should make their yoke lighter. Rehoboam answered scornfully, whereupon ten tribes revolted and set up Jeroboam as king of a separate Kingdom of Israel, with its capital first at Sichem, later at Samaria. Judah, along with a part of Benjamin and the tribe of the Levites, remained loyal to the dynasty of David. After an unsuccessful attempt to reconquer the Kingdom of Israel, Rehoboam was forced by an invasion of Shishak of Egypt to give up the hope of uniting the two kingdoms.

In the next generation things had changed so much that Asa, King of Judah, was obliged to seek the help of Benhadad of Syria against King Baasha of Israel. Baasha was succeeded by Elah, Elah by Zimri, and Zimri by Omri, under whom the Kingdom of Israel seems to have grown powerful. Omri established the capital of the kingdom at Samaria (about 906 B.C.), and subjugated the Moabites. The son of Omri, Ahab, married Jezebel, Princess of Tyre, an event which led to the extension of Phœnician idolatry in Israel. As Solomon had done before, Ahab built a temple for the Syrian Baal in his capital. In his reign and subsequently, the great prophets Elijah and Elisha played an important part.

Ahab was slain at Ramoth-Gilead in battle against the Syrians. He was succeeded by Ahaziah (853–851), and Joram (851–843). The latter was slain by Jehu, a captain of the army, who had been anointed king by command of Elisha. Jehu (843–815) now made a clearance in Samaria of Syrian idolatries, destroying the temple of Baal and putting the priests to death. Under Jeroboam II, fourth in the line of Jehu, the kingdom reached a high point of prosperity (790–749).

After Jeroboam's death there was a quick succession of kings, Zachariah, Shallum, Menahem, Pekahiah, Pekah; none of any significance. Under Pekah the Kingdom of Israel became tributary to the Assyrians. (*See* BABYLONIA AND ASSYRIA.) Hosea, Pekah's successor, made an ineffectual attempt to free the country from the Assyrian yoke; but finally, in 722, Samaria was captured by the Assyrian king, Sargon, the Kingdom of Israel virtually destroyed, and the chief inhabitants carried away and settled in Assyria and Media.

Generally while the Kingdom of Israel had been flourishing, that of Judah had stood in the background. Rehoboam was succeeded by Abijam, Asa, Jehoshaphat, the last a powerful and fortunate king. In the hope of putting an end to the war with the

Kingdom of Israel, Jehoshaphat married his son Jehoram (848–844) to Athaliah, the daughter of Ahab of Israel. After the murder of her son Ahaziah by Jehu, Athaliah seized the supreme power in Jerusalem, and put to death her own grandchildren in order to destroy the line of David, Joash alone being miraculously rescued. Athaliah was overthrown and put to death, and the young Joash raised to the throne (837–797). His successors were: Amaziah (797–792), Uzziah (792–740), Jotham, Ahaz, and Hezekiah (727–699).

Under Ahaz and Hezekiah Isaiah delivered his sublime prophecies. Hezekiah was one of the greatest reforming kings; his influence extended widely over the Kingdom of Israel, now in extreme decline. He was miraculously delivered from an invasion of Sennacherib, King of Assyria, by the destruction of the Assyrian army.

Josiah (641–610) was the last of the pious kings of Judah. He was killed in battle against Necho, King of Egypt. After him there was an uninterrupted succession of weak and incapable monarchs, till under Zedekiah (599–588) the capture of Jerusalem by Nebuchadnezzar, 588 B.C., put an end to the monarchy, Jerusalem being destroyed and many of the people being carried captive to Babylon. The prophet Jeremiah flourished from the reign of Josiah to the captivity.

In 539 Babylon was taken by Cyrus, King of Persia, who restored the Jews and appointed Zerubbabel Governor of Judæa, as a Persian province. The great majority of the Jews remained in Persia, however, only about 42,000 returned, and settled chiefly in the vicinity of Jerusalem. About 458 a second return of exiles was led from Persia by Ezra. Along with Nehemiah, who had been appointed Persian Governor of Judæa, Ezra promulgated the new law-book, practically identical with the *Pentateuch*. From the time of Nehemiah to the fall of the Persian Empire the Jews continued to live in peace as Persian subjects, but enjoying their own institutions.

When Alexander the Great overthrew the Persian Empire, the Jews readily submitted on being promised the free exercise of their religion (332 B.C.). After the division of Alexander's empire Palestine was long a possession of the Ptolemies of Egypt, under whom it enjoyed a period of tranquillity. It was under the patronage of Ptolemy (II) Philadelphus (reigned 285–247 B.C.), according to tradition, that the *Septuagint* or Greek version of the Old Testament Scriptures was made.

After the death of Ptolemy, Philopator Antiochus the Great of Syria became master of Palestine (198 B.C.). An Egyptian and a Syrian party now arose among the Jews, and gave occasion to civil dissensions, which led Antiochus IV (Epiphanes) to invade Judæa (170 B.C.), when he took Jerusalem by storm and slaughtered the inhabitants without distinction of age or sex, and endeavoured to compel the Jews to give up their religion. At length, under the leadership of the Maccabees or Asmonæan family, resistance arose, and after a struggle of nearly fourteen years was successful.

In 135 B.C. John Hyrcanus, son of Simon, a brother of Judas Maccabæus, completed the independence of Judæa, and extended his dominion over the ancient limits of the Holy Land. During his reign the rival sects of the Pharisees and Sadducees became established. Aristobulus I, the son of Hyrcanus, assumed the title of king, which was held by his successors.

In 63 B.C. Pompey, called in to help the Pharisees, took Jerusalem, and made the Jews tributary to the Romans. Afterwards Herod the Great, who entirely threw off Jewish manners and cultivated the favour of the Romans, was recognized as King of Judæa by the Roman Senate. It was in 4 B.C., the last year of his reign, that the birth of Christ took place at Bethlehem. In A.D. 6 Judæa and Samaria became a Roman province under a procurator, who had his seat at Cæsarea, and was subordinate to the prefect of Syria. Pontius Pilate, under whom our Lord's public ministry and crucifixion occurred, was made procurator A.D. 26. For a time the country was again ruled by a king, Herod Agrippa, A.D. 41–44. He persecuted the Christians and put the Apostle James to death.

In A.D. 65 a party of the Jews revolted from the Roman yoke and roused the whole of Palestine to insurrection. Vespasian was sent by Nero to suppress it, but before the war was finished was called to the empire and left his son Titus to conclude it. The result was the capture and destruction of Jerusalem, A.D. 70, an event that deprived the Jews of the centre of unity to which their national life had hitherto clung. After an insurrection headed by Bar-Cochba, 132–135, Hadrian razed the remains of Jerusalem left by Titus to the ground, and erected in their place a Gentile city, with the title Ælia Capitolina. Jews were forbidden to enter this city on pain of death, and the name of Jerusalem was not revived till the time of Constantine.

2. *Mediæval and Modern History.* The remnants of the Jewish nation, scattered over all the earth, still

possessed many advantages. They found proselytes and old believers in all countries of the Roman Empire, and in the East as far as the Ganges. Egypt and the northern coast of Africa were filled with Jewish colonies, and in the cities of Asia Minor, of Greece and Italy, were thousands enjoying the rights of citizens.

Under the Emperor Julian they ventured to make preparations for a new temple in Jerusalem. Although this attempt failed, they derived great advantages from their *sanhedrin*, revived at Tiberias, and their patriarchates (presidencies of the sanhedrin), which were established. One of the works of their scholars was the collection of the traditionary expositions of the Old Testament, and additions to it, which was completed A.D. 500, and received, under the name of the *Talmud* (q.v.), as a rule of faith by the scattered communities of Jews.

During the decline of civilization in Europe, the Jews made themselves masters of the commerce of the Old World, and, in spite of the dreadful persecutions which they underwent from the cruelty of the Christians, they still continued prosperous. Their practice of usury and the rapacity of the Christians, rather than religious hatred, were the true causes of these persecutions. In the cities of France, Germany, and Italy (where the Jews' quarter was known as the *Ghetto*), after the eleventh century, particular streets and enclosed places were assigned to them. In Germany they paid a considerable tax, in return for which they were protected as the money agents of the Holy Roman Empire. Their conversion to Christianity could not be effected by such treatment. In Spain and Portugal, indeed, at the end of the fifteenth century they yielded to force, and suffered themselves to be baptized *en masse*, but as soon as the storm was over they were seen again in the synagogues. The worship of saints and relics must have appeared to them idolatry, and might well persuade them that their own pure monotheism was more rational and scriptural.

The philosophical spirit of the last half of the eighteenth century first began to acknowledge the rights of the Jews. In France, as a consequence of the Revolution, civil rights were granted to the Jews at the end of the eighteenth century, and gradually a similar treatment was accorded them in most European countries. In Russia, until 1917, they were still under special laws, and were excluded from public life. After repeated unsuccessful attempts to procure their admission into the British Parliament, the object was at last effected by an Act passed in 1858.

Singularly enough, towards the end of the nineteenth and at the beginning of the twentieth centuries the Jews in several countries were the victims of a revival of the persecuting spirit. This was the case in portions of Russia, under the government of the Tsars as well as since the Revolution of 1917. France, too, witnessed outbreaks of the anti-Semitic spirit, which was largely at work in connection with the Dreyfus case, and met with considerable support from a section of the press. In Germany anti-Semitic societies were formed in various towns. In 1933, under the Nazi régime, persecution of the Jews broke out in Germany.

Amongst the Jews themselves arose the movement known as *Zionism* (q.v.), which aimed at the settlement in Palestine of an independent Jewish community. With the capture of Jerusalem by the British in 1917, and the subsequent declaration by Lord (then Mr.) Balfour that the British Government would endeavour to make Palestine a national home for the Jewish people, Zionism received a great impetus. Palestine was mandated to Britain by the League of Nations, and Sir Herbert Samuel was appointed High Commissioner. In 1918 a Hebrew University was established in Jerusalem, and was officially opened in 1925 by Lord Balfour. There are about 15,000,000 Jews scattered throughout the world. In 1929 trouble broke out between the Jews and the Mahommedans over the Wailing Wall, which is sacred to the Jews. *See* PALESTINE, ZIONISM.—BIBLIOGRAPHY: H. H. Milman, *The History of the Jews*; Lady Magnus, *Outlines of Jewish History*; Th. Reinach, *Histoire des Israélites*; G. F. Abbott, *Israel in Europe*.

JEW'S EAR, a Basidiomycetous Fungus, *Auricularia Auricula Judæ*, the type of the family Auriculariineæ, distinguished by their basidia being divided by transverse walls, like those of the Rusts. It is a parasite on elder. The common and botanical names are based on a fancied resemblance of the fruit-body to the human ear.

JEWS'-HARP, a toy musical intrument held between the teeth, which gives a sound by the motion of a tongue of steel, which, being struck by the hand, plays against the breath. Called also *Jews' Trump*, or simply *Trump*.

JEZ'REEL, a city of Palestine, chosen by Ahab, King of Israel, as his chief residence. The modern Arabian name of the place is Zerin.

JEZREELITES, a religious sect founded in Chatham by James

White (1840–85), who assumed the high-priesthood, under the name of James Jershom Jezreel, and gained many proselytes. When their temple and place of refuge at Gillingham, Kent, was only partially completed, the work was abandoned through lack of money. Some Jezreelites are still to be found in Chatham, and they have a firm belief in the ultimate destruction of the world by flood. The abandoned refuge-place and temples are still to be seen, and the grounds were used, before the European War, for demonstrations of a mono-rail machine.

JHÁLÁWÁR, Indian native state in Rájputána; area, 810 sq. miles; pop. 96,182. Capital, Jhalra Patan, or Pátan; pop. 12,000.

JHANG, a town of India, in the Punjab, about 3 miles from the Chenab. Pop. (with adjoining Maghiana), 30,129.—Jhang district has an area of 5,871 sq. miles; pop. 570,559.

JHANSI (jhăn'sē), a fortified town of Central India, in Gwalior state, and an important railway centre. Within the town stands the fort on a rock. Pop. (with cantonment), 66,432.

JHELUM (jhā'lam), or **JHILAM** (jhē'lam) (anciently **HYDASPES**), a river of India, the most westerly of the five great rivers that intersect the Punjab. It rises in Kashmir, flows south, forming the boundary between Kashmir and the Punjab, then south-west through the Punjab, and finally falls into the Chenab. Its whole course is about 450 miles, and it is navigable for the flat-bottomed boats of the country from its junction with the Chenab up nearly to its emergence from the mountains.

There is a town of the same name on the right bank of the river, with military cantonments. Pop. 20,000.

JIBUTI, or **JIBOUTI,** a port on the Gulf of Aden, founded 1888, at the south entrance to Tajurra Bay, with a good harbour. It is the seat of government of French Somaliland, and is the starting-point of a metro-gauge railway to Addis Abbaba, the capital of Abyssinia. Pop. 8,366.

JIDDA, chief seaport of the Kingdom of Hejaz, Arabia, on the Red Sea, the port of entry for pilgrims making the *Hadj*. The Treaty of Jidda (a treaty of peace and friendship) between Britain and Ibn Saud, King of Nejd and the Hejaz, was signed in 1927. Pop. 25,000.

JIGS, appliances used in engineering workshops in the manufacture in quantity of articles of standardized sizes, to remove the necessity for measurement and marking-off on each piece. When a number of holes are to be drilled in many pieces of the same form, a jig would be made in the form of a plate with bushed holes at the places where the drills are to go through. This jig would be provided with projections, so that it can be quickly placed in exact position on the article, and with clamps or hook-bolts to hold the two together. The drilling would be done through the jig holes. If some of the holes are to be of a certain specified depth, shoulders would be made on the jig to prevent the work being carried on to a greater extent than desired. Jigs are also employed in turning, boring, and other machine operations.—Cf. Frank Lord, *First Principles of Jig and Tool Design.*

JIHLAVA. *See* IGLAU.

JINGOISM, a term equivalent to the French word *Chauvinisme,* is applied to the warlike attitude of the advocates of imperialism and fighting patriots. The word is derived from the slang expression 'By Jingo,' and came into use in 1878, when, during the Turko-Russian War, a piece of doggerel was being sung at the music halls. The lines referred to were as follows:

We don't want to fight,
But, by Jingo, if we do,
We've got the ships, we've got the men,
And got the money too.

JINJA, a town of Uganda Protectorate, on the north of Lake Victoria. It is the terminus of the Busoga Railway, and the steamer connection from Jinja to Mwanza is a link on the Cape to Cairo route. It is a busy commercial centre, and the only outlet for the cotton, rubber, and other produce of a large area.

JINN, *Jinnee* being the singular (Ar. *janna,* to be veiled, be dark), in Mahommedan mythology, a race of genii, angels, or demons fabled to have been created several thousand years before Adam. The seventy-second Sura of the *Koran* is devoted to them. They are both male and female, eat and drink and die, although they generally live very long. They are to survive mankind, but to die before the general resurrection. Some are good and obedient to the will of God; others are disobedient and malignant. They can assume the shape of the lower animals, and are visible or invisible as they please. Their chief residence is the mountain Káf in Arabia.

JOACHIM (yō'ä-*h*ēm), **Joseph,** violinist and composer, born of Jewish parents near Pressburg in 1831, died in 1907. He studied at Vienna and Leipzig, and in 1844 made a first visit to London, where he was enthusiastically received. He was

concert director at Weimar from 1850 to 1853, at Hanover till 1868, and in 1869 was appointed head of the Conservatory of Music in Berlin. As a violinist he was gifted with a supreme power both of execution and interpretation, whilst his compositions are held in high estimation. He was leader of the famous Joachim Quartet.

JOACHIMSTHAL (yo'a-*h*ims-tāl), a small mining town of Bohemia, Czechoslovakia, in a valley of the Erzgebirge, 70 miles W.N.W. of Prague. It depends chiefly on its valuable lead- and silver-mines. *Thaler* pieces derived their name from being first coined here. Pop. (commune), 8,000.

Joan of Arc

JOAN, the female Pope, according to a story long believed, but now acknowledged to be a fiction, was said to have been a native of Mainz, who, falling in love with an Englishman at Fulda, travelled with him in man's attire, studied at Athens, and visited Rome. Under the name of Johannes Anglicus, she rose by her talents from the station of a notary till she was elected to the Papal chair, under the name of John VIII (A.D. 854 to 856, between Leo IV and Benedict III). She governed well, but having become pregnant, she was delivered in a solemn procession, and died on the spot.—BIBLIOGRAPHY: J. Döllinger, *Papal Legends of the Middle Ages*; E. D. Rhoides, *Pope Joan*; S. Baring-Gould, *Curious Myths of the Middle Ages.*

JOAN OF ARC (*Jeanne d'Arc*—properly *Darc*), the Maid of Orleans, a heroine in French and English history, was born in the village of Domrémy, Basse Lorraine, now department of the Vosges, between 1410 and 1412. While she was still a girl she began to be deeply affected by the woes of her country, much of which was conquered by the English, leaving only a small portion to the French king, Charles VII.

In 1428 Orleans was being besieged by the English, and its fall would have ruined the cause of Charles. At this time Joan, who had been noted for her solitary meditations and pious enthusiasm, began, as she declared, to see visions and hear angelic voices, which ultimately called upon her to take up arms for Charles, to raise the siege of Orleans, and conduct Charles to Rheims to be crowned. At first she was regarded as insane, but eventually she found her way to the king and his councillors, and, having persuaded them of her sincerity, received permission to hasten to Dunois (q.v.), the heroic soldier known as the Bastard of Orleans, who was commander in that city. In male dress, fully armed, she bore the sword and the sacred banner, as the signal of victory, at the head of the army.

The first enterprise was successful. With 10,000 men she marched from Blois, and on the 29th April, 1429, entered Orleans with supplies. By bold sallies, to which she animated the besieged, the English were forced from their entrenchments, and Suffolk abandoned the siege (8th May, 1429). Other successes followed; Charles entered Rheims in triumph; and at the anointing and coronation of the king, 17th July, Joan stood at his side.

She was wounded in the attack on Paris, where Bedford repulsed the French troops, but continued to take part in the war till 23rd May, 1430, when she was taken prisoner by the Burgundians, and sold to the English. She was taken to Rouen, and after a long trial, accompanied by many shameful circumstances, condemned to death by the Church as a sorceress. On submitting to the Church, however, and declaring her revelations to be the work of Satan, her punishment was commuted to perpetual imprisonment. But pretexts were soon found to treat her as a relapsed criminal, and as such she was burned at Rouen, 30th May, 1431, and her ashes were thrown into the Seine. She died with fortitude.

Twenty-five years after, a court, specially constituted by Pope Calixtus III to examine the charges against the Maid of Orleans, pronounced her innocent. Voltaire, in a notorious burlesque, Southey, Schiller, and others have made her the subject of their verse. Schiller's drama still remains the worthiest monument of her

fame. G. B. Shaw has written a play *Saint Joan of Arc*. The question of her canonization came up before the Roman Curia in 1875, and she was beatified by Pope Pius X on 11th April, 1909. On 16th May, 1920, she was canonized in St. Peter's at Rome. —BIBLIOGRAPHY: A. Lang, *The Maid of France*; M. G. Fawcett, *Five Famous French Women*; Anatole France, *Vie de Jeanne d'Arc*.

JOB. In the beginning of the sixth century B.C. the prophet Ezekiel mentions Noah, Daniel, and Job as three men of pre-eminent piety (xiv, 14, 20). Later, in the fifth century, the story of Job was written, and to this book we owe all our knowledge of the man.

(*a*) His country is Uz, which has been located either near the Orontes or Palmyra, or else in the vicinity of Edom (*see* Lam. iv. 21: "Rejoice and be glad, O daughter of Edom, that dwellest in the land of Uz"). In any case, he is a non-Israelite.

(*b*) His name evidently came down from tradition. It is in Hebrew *Iyyob*, but its meaning is never explained. It may denote the pious, or the persecuted one.

(*c*) His story is the important fact about him in the *Book of Job*. It is an Oriental tale about his terrible sufferings, when he lost suddenly his property and his children, in spite of the admitted piety of his life. This is the problem of the book. Why does suffering come to the good man? The writer throws his message or discussion into prose and poetry, the prologue and the epilogue being in prose, and the rest of the book being in poetry.

Critical analysis has shown that the extant book contains an original sketch, with additions. The original probably included the prologue (i–ii), three cycles of dialogue between Job and three friends who attempt to console or to rebuke him (iii–xiv, xv–xxi, xxii–xxxi), God's reply to Job (xxxviii–xlii, 6), and the epilogue (xlii, 7–17), in which Job is restored to a still more prosperous condition. In this framework there has been inserted a series of speeches (xxxii–xxxvii) by a young bystander called Elihu, who is never mentioned in the prologue or epilogue. Also, the magnificent passage on Wisdom (xxviii) and some other sections are out of line with the rest of the book.

The dramatic quality of the dialogues is high. Each of the three friends is characterized skilfully, and the swaying emotions of despair and hope and rebellion in Job himself are drawn with masterly care. The fine nature-poetry and the humour pale before the intense impression of a human soul wrestling with the problem of pain befalling an innocent being. For Job is represented in the prologue as a blameless man. Is suffering due to sin? Is this ancient belief adequate to the facts of life? Such are the questions the author asks himself. He states them rather than solves them. He shows that the traditional formula is unequal to life, and urges that God prefers honest perplexity to self-satisfied theories, that man is not the measure of the divine dealings, and that there is no unvarying relation between prosperity and righteousness.

Job is not an Israelite, and the problem of human suffering is not related to the Jewish law. The writer treats it on broad human lines, letting Job say daring things to God in his agony, and pouring into the dialogues some of the most trenchant reflections upon life that occur in the pages of the Old Testament. Some have taken it as an Oriental drama. It is at any rate not meant to be a history; but a tale conveying truth, one of the greatest apologues that have come down from ancient life, the story of a sharp experience, perhaps written by some sage of Israel who desired to express his views about the meaning of the strange sufferings which had befallen Israel at and after the exile, and to suggest that affliction might be not punishment for sin, but a test of righteousness, ending in good at the hand of God. Not that Job represents Israel. But the writer takes this hero of a traditional tale in order to depict in his mysterious trials and ultimate recovery the ways of God with the nation of Israel in its present distress. —BIBLIOGRAPHY: S. R. Driver, *Introduction to the Literature of the Old Testament*; J. A. Froude, *Short Studies on Great Subjects*; M. Jastrow, *The Book of Job*; G. K. Chesterton, *The Book of Job*.

JOB'S TEARS (*Coix lachryma*), an annual grass about a foot in height, a native of the East Indies and Japan, sometimes grown in hot-houses. The hard, round, shining grains, from whose fanciful resemblance to tears it derives its name, are used both for ornament and as food.

JODHPUR (jōd-pör'), or **MARWAR**, a town of India, capital of the state of Jodhpur. It stands in a hollow enclosed by rocky eminences, on the highest of which is a fort, containing the Maharajah's palace, and commanding the city. The city has many handsome buildings, and is surrounded by a strong wall 6 miles long, with seventy gates. Pop. 73,480.

The state of Jodhpur or Marwar is the largest in Rājputāna, having an

area of 35,066 sq. miles; it is well watered by the Luni and its affluents; and though arid in many parts, raises in others good crops of wheat, barley, and millet. Pop. 1,841,642.

JOEL, one of the twelve minor prophets. Nothing is known of his life. He is generally supposed to have been contemporaneous with Hosea and Amos. The immediate occasion of his prophecy was a protracted drought and the ravages of an invading swarm of locusts. His book expands, however, in a style of high sublimity into predictions of future prosperity when the divine judgments should have purified the nation. Joel is quoted by St. Peter, *Acts*, ii, 16–21.

JOE MILLER, the name attached to a well-known collection of jests, first published in 1739. The name belonged to a comic actor, famous as a wit and humorist. The real compiler, however, was a John Mottley, an obscure author who died in 1750.

JOFFRE, Joseph Jacques Césaire, Marshal of France, born at Rivesaltes 12th Jan., 1852, died 3rd Jan., 1931. In 1869 he entered the École Polytechnique, Paris, and was sub-lieutenant of engineers during the siege of Paris and the campaign of 1870–1. Promoted captain in 1875, he was not further advanced for fourteen years, when he rapidly moved upwards to major (1889), lieutenant-colonel, and was decorated with the Legion of Honour (1894); professor at École de Guerre; brigadier-general of artillery (1901); Governor of Lille and general of division (1905); commander, Second Army, and Inspector of Military Schools (1909).

In 1911 the notorious Caillaux recognized Joffre's great capabilities by nominating him Chief of General Staff, and as such, by a recognized rule of the French army, Joffre became Generalissimo of the land forces of France upon the outbreak of the European War in 1914. He commanded the French armies until the rearrangement of the High Command, when he retired (Dec., 1916), subsequently becoming Chief Technical Adviser to the Allied Forces, and accompanying Viviani on his mission to America in 1917. Joffre was decorated G.C.B. by King George V, 1st Dec., 1914; was a member of the French Academy, and published *La Colonne Joffre* (*My Journey to Timbuctoo*, in English), and *Types de Casernes pour adopter en Madagascar*. —Cf. S. Blanchon, *Le Général Joffre*.

JOHAN'NESBURG, the largest town in South Africa, in the province of Transvaal, the central point of the gold-fields of the district stretching 50 miles west to east, and known as the Witwatersrand. Dating from 1886, and created by the mining industry, it now covers a large area, the streets and squares are all well laid out, and the public and commercial buildings handsome and substantial. It has a well-endowed university-college. European pop. (1931), 203,273.

JOHAN'NISBERG, a village of Prussia, on the Rhine, about 12 miles west by south of Mainz, among the vineyards that produce the famous Johannisberg wine.

JOHN, one of the Apostles, often distinguished as *St. John the Evangelist*, the reputed author of the fourth Gospel, three epistles, and the *Revelation*, was the son of Zebedee and Salome, and the brother of James. Previous to his call by Jesus he was a fisherman on the Sea of Galilee, together with his father, his brother, and Simon Peter and Andrew, who were his partners. John, together with Peter and James, was admitted to a more confidential intercourse with Jesus than the other Apostles, and he is repeatedly spoken of as 'the disciple whom Jesus loved.'

His Gospel was written later than any of the others—according to some critics to refute particular heresies—and contains fuller details of our Lord's conversation and discourses than the other Gospels, and is also more doctrinal in character. Of the three epistles the first has much resemblance to the Gospel; but the other two were considered doubtful even by the early Fathers. (As to the *Revelation*, see special article.)

After the death of Jesus, John continued at Jerusalem, and we afterwards find him at Samaria (*Acts* viii, 14–25). Tradition handed down by the Fathers makes him die at Ephesus, and if he wrote the *Revelation* he must have been banished to Patmos. The time of his death is unknown.—BIBLIOGRAPHY: V. H. Stanton, *The Gospels as Historical Documents*; W. Sanday, *The Criticism of the Fourth Gospel*; J. Moffatt, *Introduction to the Literature of the New Testament*.

JOHN, called the *Baptist*, the forerunner of Christ, was born six months before Jesus (their mothers were cousins), of a Levitical family in Judæa. He lived an austere life, given up to solitary meditations, till A.D. 26, when he began to preach in the deserts of Judæa, announcing that the kingdom of heaven was at hand, and proclaiming himself the harbinger of the Messiah. He baptized many converts, and testified to the higher mission of Jesus at the time of His baptism in the Jordan. To gratify a

vindictive woman Herod Antipas, tetrarch of Galilee, caused him to be beheaded in prison. But for long afterwards his disciples continued to form a separate body, and are said to have established the still existing sect of Sabians or St. John Christians in Persia, distinguished for their veneration of John the Baptist.—Cf. H. R. Reynolds, *John the Baptist*.

JOHN, the name of twenty-three Popes, among whom are the following:—**John I** (*St. John*), Pope A.D. 523–526. Theodoric sent him to Constantinople, to induce the Emperor Justin to adopt milder measures towards the Arians, and on his returning without success Theodoric threw him into prison, where he died.

John XII succeeded Pope Agapetus II in 956, when only eighteen years old. He was the first Pope who changed his name on his accession to the Papal dignity. His life was so licentious and disorderly that the Emperor Otho had him deposed by a council in 963, and Leo VIII elected in his stead. But on Otho's departure John returned to the city with a strong body of followers and drove out Leo. He died in 964.

John XXII, a native of Cahors, was elected Pope at Lyons in 1316, after the death of Clement V. He resided at Avignon, and took an active part in the disputes of the Emperors Louis of Bavaria and Frederick of Austria. He died in 1334.

John XXIII (*Balthasar Cossa*), born in Naples, was a pirate in his youth, afterwards studied at Bologna, and was elected Pope in 1410, by the Council of Pisa, after the death of Alexander V, on condition that, if Gregory XII and Benedict XIII would resign, he would also retire to end the schism. He summoned the Council of Constance, demanded by the Emperor Sigismund, in 1415, and was deposed by this council as guilty of a long list of heinous crimes. For some years he remained in custody, but was ultimately pardoned by Pope Martin V, and made a cardinal. He died in 1419.—Bibliography: Mandell Creighton, *History of the Papacy*; L. Pastor, *History of the Popes*.

JOHN, King of England, born in 1167, died in 1216. He was the youngest son of Henry II, by Eleanor of Guienne. Being left without any particular provision, he got the name of *Sans Terre* or Lackland; but his brother, Richard I, on his accession conferred large possessions on him. He obtained the crown on the death of Richard in 1199, although the French provinces of Anjou, Touraine, and Maine declared for his nephew, Arthur of Brittany, who was lineally the rightful heir, then with the King of France. A war ensued, in which John recovered the revolted provinces and received homage from Arthur.

In 1201 some disturbances again broke out in France, and the young Arthur, who had joined the malcontents, was captured and confined in the castle of Falaise, and afterwards in that of Rouen, and never heard of more. John was universally suspected of his nephew's death, and the states of Brittany summoned him before his liege lord Philip to answer the charge of murder, and in the war which followed John lost Normandy, Anjou, Maine, and Touraine.

In 1205 his great quarrel with the Pope began regarding the election to the see of Canterbury, to which the Pope had nominated Stephen Langton. The result was that Innocent III laid the whole kingdom under an interdict, and in 1211 issued a Bull deposing John. Philip of France was commissioned to execute the decree, and was already preparing an expedition when John made abject submission to the Pope, even agreeing to hold his kingdom as a vassal of the Pope (1213).

John's arbitrary proceedings led to a rising of his nobles, and he was compelled to sign the Magna Charta or Great Charter, 15th June, 1215. But John did not mean to keep the agreement, and obtaining a Bull from the Pope annulling the charter, he raised an army of mercenaries and commenced war. The barons, in despair, offered the crown of England to the dauphin Louis, who accordingly landed at Sandwich 30th May, 1216, and was received as lawful sovereign. The issue was still doubtful when John was taken ill and died at Newark, in the forty-ninth year of his age.—Cf. Kate Norgate, *England under the Angevin Kings*.

JOHN II, King of France (1319–64), surnamed the *Good*, was a monarch distinguished alike for his incapacity and his misfortunes. In 1356 he was defeated and taken prisoner by the Black Prince at the battle of Poitiers, and was detained at Bordeaux and at London till released at a heavy expense to his country by the Peace of Brétigny in 1360; but on learning that his son, the Duke of Anjou, who had been left as a hostage in England, had effected his escape, he returned to London, where he died in 1364.

JOHN III (*Sobieski*), **King of Poland**, son of Mark Sobieski, a Polish captain, was born at Olesko, in Galicia, 8th June, 1624, died 17th June, 1696. He served in the French army, returned to Poland to repel the

Russians in 1648, and greatly distinguished himself in several campaigns against Cossacks, Tartars, and Turks, especially by his defeat of the last in the great battle of Khotin in 1673. The year after, on the death of Michael Corybut, he was chosen king. His most celebrated achievement was the relief of Vienna, besieged by a great army of Turks, whom he decisively defeated 12th Sept., 1683. His last years were disturbed by the intrigues of his own family and the anarchy of the country, which he was unable to control, and in which he foresaw its approaching downfall.

JOHN, Augustus Edwin, English painter. Born in 1878, he studied art at the Slade School, London, and soon exhibited at the Royal Academy. His figure paintings, such as "Going Down to the Sea" and "The Orange Jacket" attracted much attention, but he is perhaps best known for his portraits. In 1921 John was elected A.R.A. and in 1928 R.A. Among his portraits are those of Mme. Suggia and Sean O'Casey.

JOHN, Sir William Goscombe, British sculptor. Born in Cardiff in 1860, he went to London to study art. After a period in Paris, he began to work as a sculptor. His pieces include statues of King Edward VII at Capetown; the Duke of Devonshire at Eastbourne; Viscount Wolseley in London and the Earl of Minto in Calcutta. He designed memorials to the Marquess of Salisbury in Westminster Abbey and Sir Arthur Sullivan in S. Paul's Cathedral, as well as some war memorials and the regalia and medal used at the investiture of the Prince of Wales at Caernarvon in 1911. He was knighted in that year, having been A.R.A. since 1899 and R.A. since 1909.

JOHN BULL, a name first used by Dr. Arbuthnot, in 1712, and since popularized as a typical name suggesting a humorous or burlesque representation of the English character. He is represented as a bluff, jolly, bull-headed farmer.

JOHN OF AUSTRIA, commonly called *Don John of Austria*, the natural son of the Emperor Charles V and Barbara Blomberg, was born at Ratisbon in 1545, and died in 1578. In 1570 he conducted a campaign against the recalcitrant Moors of Granada with great vigour and relentlessness, and in the following year he commanded the allied fleet which won the great naval battle of Lepanto over the Turks (7th Oct. 1571). In 1576 he was appointed Governor of the Netherlands, and had just won along with the Prince of Parma the victory of Gembloux (1578) over William the Silent, when he died, not without suspicion of having been poisoned by his jealous half-brother, Philip II.—Cf. L. Coloma, *Story of Don John of Austria.*

JOHN OF GAUNT, a corruption of *Ghent*, where he was born in 1340, died 1399, was the fourth son of Edward III and his queen Philippa, daughter of the Earl of Hainaut. He was created Duke of Lancaster in 1362; served in the French wars, and became Governor of Guienne. He assumed in right of his wife the title of King of Castile, invaded the kingdom to assert his claims, but subsequently relinquished them in favour of Prince Henry of Castile, who had become his son-in-law. His eldest son Bolingbroke became King of England as Henry IV.

JOHN O' GROAT'S HOUSE (popularly *Johnny Groat's House*), a house formerly situated about 2 miles west of Duncansby Head, and forming about the most northern extremity of the mainland of Great Britain. According to legend, it was built in octagonal form, with eight doors, and contained eight tables, to prevent disputes on precedence in the Groat family.

JOHN'S, EVE OF SAINT, a popular celebration of remote antiquity, held on the vigil or eve of the feast of the nativity of John the Baptist, 24th June (Midsummer Day). On the eve of the feast it was the custom in former times to kindle fires (called St. John's fires) upon hills in celebration of the summer solstice, and various superstitions were long practised on this occasion. The custom still lingers in some parts of Europe.

JOHNS HOPKINS UNIVERSITY, one of the foremost universities of the United States, in Baltimore, Maryland, endowed by Johns Hopkins, a merchant of Baltimore, with more than 3,000,000 dollars, founded in 1867, and opened in 1876. Besides the library there are well-equipped laboratories for chemistry, biology, &c. There is an extensive teaching staff (681 instructors in 1932), and instruction is given to two grades of students, graduates and undergraduates. The former are such as have taken a degree here (that of B.A.) or elsewhere, and wish to carry their studies farther, this university giving special attention to advanced studies of various kinds, as well as to original research.

A number of periodicals are issued in connection with the university. There are, besides numerous scholarships, about twenty fellowships, each of the value of 500 dollars annually.

A hospital, also endowed by Johns Hopkins, is connected with this institution.

JOHNSON, AMY, British airwoman, was born at Hull in 1904. She graduated at Sheffield University and entered on a business career in London. In 1928 she determined to devote her time to aviation and in May 1930, she set out alone in a D.H. Moth machine to fly from England to Australia. She reached Port Darwin, Northern Australia, 19 days later after a perilous flight. By reaching Karachi in six days she established a record.

In November, 1932, she also broke the record of the fastest time from England to South Africa by flying from Lympne to Cape Town, 6,220 miles, in four days six hours and fifty-four minutes.

In 1932 she married Jim Mollison, the noted airman who has also many air-records to his credit. He was the first man to fly both the North and South Atlantic and rose to fame when, in 1928, he flew from Australia to Britain, breaking the previous record by 49 hours. In 1932, he flew from England to Cape Town in 4 days, 17 hours and 19 minutes, and later in the same year was successful in making the first solo east-to-west flight across the North Atlantic in a light machine.

In 1933 he and Amy Johnson set out to fly from England to New York in their machine the *Seafarer*, their objective being to fly from New York to Bagdad for the world's long-distance record. Although they crashed some 50 miles from their destination, by crossing the Atlantic they established seven records.

JOHNSON, Andrew, seventeenth President of the United States, born in North Carolina 1808, died 1875. He was self-educated; entered Congress as a Democrat in 1843, and the Senate in 1857. On Lincoln's election he became Vice-President, and thus became President upon the assassination of Lincoln in April, 1865. During his term of office he was in constant conflict with the Senate, and was impeached by the House of representatives of high crimes and misdemeanours (Feb., 1868), the trial ending in a technical acquittal. A general amnesty to the rebels was his last presidential act.—Cf. J. S. Jones, *Life of Andrew Johnson*.

JOHNSON, Jack, negro boxer. Born at Galveston, U.S.A. in 1878, he first became known in 1907 by beating Robert Fitzsimmons in two rounds at Philadelphia. He became the world's heavyweight champion in 1908, by beating Tommy Burns, and in 1910 won a celebrated battle at Reno over James J. Jeffries. In 1915 he lost the championship to Jess Willard. He published *Mes Combats* in 1914.

JOHNSON, Samuel, English lexicographer and literary dictator, was born on the 18th Sept., 1709, and died on the 13th Dec., 1784. His father was Michael Johnson, a bookseller of Lichfield. Johnson largely educated himself in his father's shop, though he attended schools at Lichfield and at Stourbridge.

In 1728 he went up to Pembroke College, Oxford; the exact duration of his stay there is uncertain, but he did not graduate, though he acquired a reputation for learning, and translated Pope's *Messiah* into Latin verse. Johnson's father died on the verge of bankruptcy in 1731, and Johnson had some difficulty in securing employment. He became an usher at Market Bosworth Grammar School in 1732, but hated his work, and went to Birmingham, where he assisted the publisher of the *Birmingham Journal*, and translated Lobo's *Voyage to Abyssinia* from the French—his first book.

In 1735 he married a widow, Mrs. Porter, who was more than twenty years his senior. He described the match himself as "a love-marriage on both sides." He then attempted to start a school at Edial, near Lichfield, but his grotesque appearance terrified his pupils so much that the project was a failure. David Garrick was one of his few pupils; in March 1737 he and Garrick set out for London together with hardly any money. Johnson began by contributing to *The Gentleman's Magazine*, and edited reports of the debates in Parliament, which to avoid legal penalties were entitled *Reports of the Debates of the Senate of Lilliput*, and provided with fictitious names. After a while he wrote these reports himself, continuing to do so from July, 1741, to March, 1744. He based his reports upon very inadequate notes, and always took care that "the Whig dogs should not have the best of it."

In 1738 Johnson published his poem *London*, which is a free imitation of the third satire of Juvenal. He gained a certain amount of fame and ten guineas in cash. In 1744 he published his *Life of Richard Savage*, whom he had known intimately, and who was an earl's son and an outcast from society.

In 1747 he issued the plan of his famous *Dictionary*, and began work upon it in the same year. He used an interleaved copy of Bailey's *Dictionary* (1721), and employed six amanuenses, five of whom were Scots. While at work on the *Dictionary* Johnson wrote his second Juvenalian poem,

The Vanity of Human Wishes, an adaptation of the tenth satire. He received fifteen guineas for it. In the same year (1749) Garrick procured the production of Johnson's tragedy *Irene*. It ran for nine nights, and brought its author in almost £300, but it was a failure. Johnson did not visualize his characters, and the play consists of a series of moral dialogues, without any adequate action.

In 1750 Johnson commenced to publish *The Rambler*, a paper which was modelled upon *The Spectator*. It appeared twice weekly, on Tuesdays and Saturdays, from March 1750, to March, 1752. Johnson wrote it all himself, with the exception of five numbers, one of which was written by Samuel Richardson, and the other four by lady devotees of Johnson. *The Rambler*, although it contains plenty of sound sense, is little read nowadays; it is over-weighted with moralizing, and its occasional attempts at humour are ponderous in the extreme.

In 1752 Johnson suffered a heavy blow in the death of his wife. He completed and published his *Dictionary* in 1755, and on 7th Feb. of that year wrote his famous letter to the Earl of Chesterfield in which he rejected the earl's belated offer of patronage. Before the publication of the *Dictionary* some of his friends helped him to secure the M.A. degree of Oxford, in order that it might appear on the title-page.

In April, 1758, the first number of his *Idler* appeared; it was published every Saturday in Newbery's *Universal Chronicle*, and continued for two years. The papers in *The Idler* are shorter than those in *The Rambler*, and are somewhat less heavy-handed. The characters have English instead of Latin names, and the criticism offered is more mature. In 1759 Johnson's mother died, and to pay the expenses of her funeral he wrote *Rasselas* (originally known as *The Prince of Abyssinia*) in less than a week, and received £100 for it. *Rasselas* is a moral essay rather than a novel; it is somewhat heavy, but it still remains one of the best books of the eighteenth century. It was the most popular of his works, and was translated into nine languages.

In 1762 Johnson received a pension of £300 from Lord Bute, and so was able to spend his time as he liked, that is to say, he was able to talk much and write little. On the 16th May, 1763, Boswell was introduced to Johnson; in the same year The Club (afterwards known as The Literary Club) was founded. In 1765 Johnson produced his long-promised edition of Shakespeare, in eight volumes. It is customary to follow Macaulay in calling this a slovenly and worthless edition. As a matter of fact, Johnson had one quality which is unfortunately rare among Shakespearean scholars—he had plenty of common sense; and his shrewd sagacity and knowledge of the world kept him right where other scholars 'writing under the shelter of academic bowers' have gone astray.

In 1779 Johnson began to write what was his masterpiece—*The Lives of the Poets*. It is true that, as Mrs. Browning said, he left the poets out; many of those men whose biographies he chose to write are unknown to-day even to professional scholars, and his treatment of the few really great men that he included—notably of Milton—is not satisfactory. With all its faults, however, *The Lives of the Poets* remains one of the best books of criticism in English. It is transparently honest, and is full of common sense and its author's immense knowledge of life. Moreover, frequent indulgence in conversation tended to make Johnson's style less heavy and slightly more colloquial. In 1775 Johnson received the degree of D.C.L. from the University of Oxford; he had received the LL.D. degree from Trinity College, Dublin, in 1765. He seldom used the title of Doctor himself.

In 1773 Johnson had accompanied Boswell to Scotland, and had published *A Journey to the Western Isles of Scotland* in 1775. He accompanied his friends the Thrales to Wales in 1774, and to Paris in 1775. He had a kind of second home at the Thrales' house at Streatham, but after Thrale's death and Mrs. Thrale's marriage to an Italian musician named Piozzi, Johnson quarrelled with his benefactress, and was deprived of his old asylum. His health began to decline; he suffered from asthma and gout, and his dropsy became worse. He died on 13th Dec., 1784, and was buried in Westminster Abbey a week later.

Johnson is perhaps the best-known figure in English literature, and yet his books are seldom read. *Irene* is forgotten; *Rasselas* is considered ponderous; even *The Lives of the Poets* is not appreciated to the full. The great *Dictionary*, a pioneer work in its day, but etymologically valueless, has been superseded. Johnson is a unique example of a man who has been dissociated from his books. He is remembered chiefly as a conversationalist, and owes no small part of his fame to Boswell, the prince of biographers. Boswell had a strange mixture of qualities, good, bad, and indifferent, but they all combined to make him write an ideal biography.

Johnson was a most formidable man to encounter, but he was loved and respected as few other men have been. Underneath his gruff exterior he had a heart as tender as that of any woman. He combined the manners of a street-porter with the morals of a Puritan. He was kind to animals, loved children, and gave liberally to the poor. He gathered round him in his home a curious collection of pensioners, and was long-suffering to a fault with them and their jealous bickerings.

Many of Johnson's peculiarities are to be attributed to the state of his health. He was always scrofulous, and inherited a melancholic disposition from his father. He had a morbid fear of death. He suffered from a kind of St. Vitus's dance, and had the habit of 'touching' so well described by Borrow in *Lavengro*. His melancholy made him too exacting with himself, and he was continually reproaching himself with laziness. This charge has been repeated by many of those who have written about him. As a matter of fact, he left a considerable amount of work behind him, though it was his character rather than his work that made him famous. He is an embodiment of his age, for better and for worse.

He was a more absolute literary dictator than any who went before him or came after him. Above all he was the first literary man who fearlessly maintained his complete independence; he was one of the noblest of moralists; and the kindest of benefactors.—BIBLIOGRAPHY: James Boswell's *Life* (Dr. Birkbeck Hill's edition); G. B. Hill, *Dr. Johnson: his Friends and his Critics*; Sir L. Stephen, *Dr. Johnson* (English Men of Letters Series); T. Seccombe *The Age of Johnson*; J. C. Bailey, *Dr. Johnson and his Circle*.

JOHNSTON, Alexander Keith, geographer, was born near Edinburgh 1804, died 1871. His more important works were the *National Atlas*, first published in 1843; and his *Atlas of Physical Geography*, published in 1848, which gained him election to the leading geographical societies of Europe and America.

JOHNSTON, Alexander Keith, son of the preceding, a distinguished geographer and traveller, born 1846, died of dysentery at Behobeho, East Africa, while leading an expedition sent out by the Royal Geographical Society, in 1879.

JOHNSTON, Arthur, Scottish poet and scholar, born near Aberdeen, Scotland, 1587, died 1641. He studied medicine, graduating M.D. at Padua in 1610. He lived for twenty years in France, after which he came to England and became physician-in-ordinary to Charles I. His Latin poems consist of epigrams, &c., and a version of the *Psalms*.

JOHNSTON, Sir Harry Hamilton, African traveller and administrator, was born at Kennington 12th June, 1858, educated at Stockwell Grammar School and King's College, London, and was for four years a student at the Royal Academy of Arts. From 1879 to 1880 he travelled in Tunis and Algeria, and in 1882 went through Portuguese West Africa and explored part of the course of the Congo.

In 1885 he was British Vice-Consul in the Cameroons district, and in 1887 acting Consul in the Niger Coast Protectorate. In 1889 he was sent to the Lake Nyassa and Tanganyika region to make peace between the African Lakes Company and the Arabs, and his exertions resulted in the foundation of the British Central Africa Protectorate, of which he was appointed Commissioner and Consul-General in 1891. After acting as Consul-General in Tunis, he served from 1899 to 1901 as special Commissioner, commander-in-chief, and Consul-General for Uganda and adjoining territories. He was created C.B. in 1890, K.C.B. in 1896, and G.C.M.G. in 1901.

He published various works, among them being *Essays on the Tunisian Question* (1880–1); *Life of Livingstone*; *History of the Colonization of Africa*; *The Uganda Protectorate* (1902, 2 vols.); *British Mammals*; *The Nile Quest*; *Liberia, the Negro Republic in West Africa* (1906); and *The Story of my Life* (1923). His novels include *The Gay-Dombeys* (a sequel to *Dombey and Son*), and *Mrs. Warren's Daughter* (a sequel to *Mrs. Warren's Profession*). He died in 1927.

JOHNSTON, Thomas, Scottish politician. Born at Kirkintilloch in 1882, he was educated there and at the University of Glasgow. He became a journalist and founded the Socialist organ *Forward*, being also a prominent member of the Town Council of Kirkintilloch and a leader of the Independent Labour Party. In 1922 he was elected Labour M.P. for West Stirlingshire, in 1924 for Dundee, and in 1929 for West Stirlingshire again. In 1929 he was made an Under Secretary for Scotland and in 1931 he became Lord Privy Seal, his special business being to deal with unemployment. He resigned office in Aug., 1931, and lost his seat at the general election in October, 1931.

JOHNSTONE, a town of Renfrewshire, Scotland, on the Black Cart. It is the centre of various industries, having cotton and linen thread mills,

engineering-works, and tool-works. Pop. (1931), 12,837.

JOHNSTOWN, a city of Cambria county, Pennsylvania, United States, on Conemaugh River. In 1889 Johnstown and district was inundated by the bursting of Conemaugh Lake and Reservoir, situated about 10 miles above the town. Buildings (of wood) were driven by the flood into a mass of ruin, which was finally piled up against the railway bridge, and its destruction completed by fire. A relief fund of £600,000 was raised, and the city was speedily rebuilt. Pop. (1930), 66,993.

JOHORE, a native state under British Protection at the Singapore end of the Malay Peninsula; area about 7,678 sq. miles; pop. (1931), 505,309. The chief products and exports are rubber, copra, tin, arecanuts, and forest products. The total value of exports in 1931 was 34,995,441 dollars, and of imports 29,449,254. It is connected with the Island of Singapore by means of a causeway opened in 1923–24.

JOINT, in anatomy, is the term applied to the arrangement of structures found where bones or cartilages come into contact with one another. The most typical joints are found where the extremities of two bones, as, for example, is seen at the knuckles of the fingers, come into contact and a capsule of fibrous tissue passes from one bone to the other to form a closed space, the joint cavity. In such a joint the surfaces of the bones that come into contact are coated with cartilage, which is lubricated with an oily fluid (synovia) secreted by the synovial membrane, which lines the capsule but does not extend on to the cartilage. The capsule is often thickened in some places to form ligaments.

The amount and direction of the movements permitted at the different joints is subject to a wide range of variation. Some, like the joints of the fingers, enable movements to occur that are practically restricted to one plane—hence they are called hinge joints. Others, like the shoulder- and hip-joints, allow a variety of movements in almost any direction; they are called ball-and-socket joints. Others again, like the joints at the wrist, permit sliding movements. There are other kinds of joints that have no cavity, the bones being more or less firmly united one to the other by a solid mass of fibro-cartilage. At such joints little or no movement at all may be permitted.

JOINT, in engineering, the junction of two or more parts of a structure or machine. The term is used with many different senses. A steam-pipe system is built up of short lengths of piping with the flanges bolted together with a *joint* between them usually made of preparations of oiled paper. To save these joints from destruction when the pipe gets hot and expansion takes place, *expansion joints* or *bends* are necessary. These permit the expansion to take place freely without stressing the material that keeps the joint steam-tight.

The *universal* or *Hooke's joint* is a coupling connecting two shafts which are to a small extent out of line with each other. *Ball-and-socket joints, hinges,* and other *pin joints,* such as that of a crank and connecting rod, have freedom of movement in particular directions. Solid joints such as the riveted ones in boilers and those produced by the many systems of welding have none of this freedom. In steel-roof structures, the rafters, ties, bracings, and other scantlings, are held together with simple rivet joints.

Railway lines are provided with freedom to expand at the joints. The *fish-plate joint* allows this because the bolt holes in the rails are elongated. In tramways the rails are usually welded together, the expansive actions being prevented. In woodworking, joints are made by shaping the pieces of wood so that they fit into one another. A *mortise-and-tenon joint* is one in which the tenon, or part left after the sides are cut away, of the one piece fits into a hole or mortise in the other. In *scarf joints* the ends are chamfered or notched to fit to each other and held together by screws or bolts and nuts and side-plates. *Dovetail joints* are used extensively in furniture making. A number of projections of a fan-shape are cut on the one piece and fitted to openings of a complementary shape in the other.

JOINT ADVENTURE, a partnership entered into for the attainment of one specific purpose, and ceasing when the object for which it was formed has been gained. Thus a partnership formed to acquire and sell a gold-mine is a joint adventure, but one formed to carry on the business of working the mine is not. The ordinary rules of partnership apply.

JOINTS, in geology, are the planes or surfaces of separation in a consolidated rock, other than those caused by parting along the surfaces of stratified layers. In igneous rocks they are caused mostly by shrinkage, as the once molten mass finally cools and settles down, and they often arise after the development of a crystalline structure. The columnar

jointing that is seen in its highest development in basaltic lavas affords a fine example. There is often a tendency within each column towards the formation of spheroids by further contraction, and the column breaks across along curved secondary joints. Sometimes such spheroids are completely formed during the cooling of a lava, and the rock breaks up on weathering into globular bodies, the coats of which peel off like those of an onion. The *perlitic structure* of many glassy rhyolites shows the same tendency on a microscopic scale.

In granites the curved joint-surfaces frequently give a form to whole hill-sides, and thus provide features in the landscape. Exfoliation in arid countries with a high temperature takes place parallel with the joints, and gives rise to fantastic forms and huge residual blocks like boulders. In other places the tabular jointing of granite simulates stratification. Such jointing is usually parallel to some original surface of cooling.

In sedimentary rocks, joints are mostly due to torsion during earth-movements. Two series usually arise, roughly at right angles to one another and to the bedding of the strata, and these give great assistance to the quarryman. Limestones and sandstones are often traversed by joints that run continuously through successive beds, and the upturned edges of these beds, or their outcrops on a valley-side, weather away in formidable scarps.

Quartzite, owing to its resistance, generates an abundance of small joints, and often breaks down in angular fragments irrespective of the bedding. The fact that jointing in sedimentary masses cannot be ascribed to mere contraction is seen where the joints shear through hard pebbles in conglomerates.

JOINT STOCK COMPANIES, a term applied to 'an association of individuals for purposes of profit, possessing a common capital contributed by the members composing it, such capital being commonly divided into shares, of which each possesses one or more, and which are transferable by the owner.' *See* LIMITED LIABILITY COMPANIES. — BIBLIOGRAPHY: James Walter Smith, *Joint Stock Companies*; T. Eustace Smith, *Smith's Summary of Joint Stock Companies' Law*; Henry Hurrell and Clarendon G. Hyde, *Joint Stock Companies Practical Guide.*

JOINT-TENANTS are those that hold lands or tenements, or other property, as goods and chattels, by one title, without partition. In a joint-tenancy the last survivor takes the whole, as if the estate had been given to him only, unless any of his companions have conveyed away their shares by deed.

JOINTURE, a term of English law originally applied to estate settled by a husband on himself and his wife jointly, but later including estate settled on the wife alone as a provision for her in the event of the husband's predecease. Jointure was one of the old means employed to bar the wife's right to dower. By the Law of Property Act, 1925, dower has now been abolished.

JOINVILLE (zhwaṇ-vēl), **Jean, Sieur de,** French historian, born in Champagne *c.* 1224, died *c.* 1319. He entered the service of Thibaut, King of Navarre, and in 1248 raised a troop of nine knights and 700 men-at-arms to accompany Louis IX in his first crusade to the Holy Land. He rose high in favour with Louis, shared his captivity, returned with him to France in 1254, and spent much of his time at court. His *Histoire de St. Louis*, one of the most valuable literary productions of the Middle Ages, has been frequently reprinted.

JOISTS (O.Fr. *giste*, bed), in carpentry, are the beams of timber to which the flooring of rooms and the laths of a ceiling are nailed, and which rest on the walls or girders, and sometimes on both. They are laid horizontally, and in parallel equidistant rows.

JOKAI (yō'kâ-i), **Mor (Maurice),** Hungarian novelist, born in 1825, died in 1904. His first novel, *Working Days*, was published in 1846, and he produced altogether over 200 volumes of novels and tales, dramatic and other poems, and humorous essays. Among his numerous dramas are: *The Jew Boy*, *King Koloman*, *Manlius Sinister*, *The Martyrs of Szigetvar*, and *Milton*. His *History of Hungary* appeared in 1884.

JO'LIET, capital of Will county, Illinois. It has an important state prison, large limestone quarries, and steel- and iron-works, &c. Founded in 1831, it became a city in 1852. Pop. (1930), 42,993.

JOMELLI (yo-mel'lē), **Niccolo,** Italian musical composer, born 1714, died 1774. Amongst his chief works are: *L'Errore Amoroso*, a comic opera; *Armida*; *Ifigenia*; *Caio Mario*; and other operas. While chapel-master at St. Peter's he composed his *Benedictus Dominus*, a masterpiece of music. His *Requiem* and *Miserere* are particularly celebrated.

JOMINI (zho-mi-nē), **Henri,** Baron, a distinguished soldier and military

historian, born at Payerne, canton of Vaud, Switzerland, 6th March, 1779, died 24th March, 1869. He first served with the troops of his own country, but in 1804 joined the French army with the rank of major, accompanied Marshal Ney to Germany in 1805–7, and to Spain in 1808, in the capacity first of aide-de-camp, then of chief staff-officer.

In 1808 he became a brigadier-general. He distinguished himself during the Russian campaign (1812), but subsequently entered the Russian service. He retired to Brussels, and subsequently to Passy, where he died. Some of his most important works are: *Traités des grandes opérations militaires ou histoire critique des guerres de Frédéric le Grand, Principes de la Stratégie, Vie politique et militaire de Napoléon*, and *Précis de l'Art de Guerre*.

JONAH (Hebrew, signifying *dove*), one of the minor prophets, son of Amittai, and, according to 2 *Kings* xiv, 25, a contemporary of Jeroboam II, was born at Gath-Hepher, in Galilee. The book which bears his name is historical rather than prophetical, and the miraculous event of Jonah remaining three days and three nights in the belly of the fish has been regarded by some as an allegory. The story of Jonah is alluded to by Christ in *Matthew*, chapter xii, verses 39–41. What is asserted to be the grave of Jonah is shown at Mosul, Nineveh, and Gath.

JONES, Ernest Charles, English writer and Chartist. He was born in Berlin, 26th Jan., 1819, being the son of a soldier who was there in attendance on an English prince. In 1841 he wrote a story, *The Wood Spirit*, and in 1844 he became a barrister. He then joined the Chartists and, having refused a bequest of £2,000 a year to leave it, became one of the leaders of the movement. In consequence of his share in the events of 1848 he was sent to prison for two years. He tried several times to enter Parliament, but in vain. He died 26th Jan., 1869. Jones wrote *The Labourer* and other works of a social character as well as an epic, written in prison, *The Revolt of Hindostan*.

JONES, Henry Arthur, English dramatist, was born in 1851. After engaging in business, he produced his first play in 1878, though it was not till 1882 that he attracted attention with the melodrama *The Silver King*. From that time he occupied a leading place among contemporary English dramatists. Among his plays may be mentioned: *Saints and Sinners, The Middleman, The Dancing Girl, The Bauble Shop, The Masqueraders, The Case of Rebellious Susan, Michael and his Lost Angel, The Physician, The Liars, Mrs. Dane's Defence, The Whitewashing of Julia, Joseph Entangled, The Hypocrites, The Ogre*, and *The Pacifists*. Among his works on the theatre and the drama are: *The Renascence of the English Drama*, and *Foundations of a National Drama*. He died in 1929.

JONES, In'igo, British architect, was born in London on the 15th July, 1573, died 21st June, 1652. His father was a Roman Catholic cloth worker, and Jones remained a Catholic throughout his life. While a young man he travelled on the Continent, his expenses being defrayed by William Herbert, third Earl of Pembroke.

He studied architecture and followed in the main the style of Palladio. He was summoned from Venice to Denmark by King Christian IV, and is believed to have designed two great royal palaces in Denmark, at Rosenborg and Fredericksborg. He returned to England, and was employed in designing shifting scenery, machinery, and dresses for the court masques, many of which were written by Ben Jonson. He was appointed Surveyor of Works to Henry, Prince of Wales, in 1610; after Henry's death, in 1612, he again visited Italy, and in 1615 he was made Surveyor-General of Works.

He designed many well-known buildings, such as Lincoln's Inn Chapel (1617–23) and the banqueting-house at Whitehall, which was begun in 1619 and completed in March, 1622, at a cost of over £15,000.

Jones was a man of an imperious and domineering disposition, and had many quarrels with Jonson, who was equally obstinate and self-assertive. The two collaborators never can have worked smoothly together at their masques; there was a good deal of enmity by 1617; and the final breach came in 1631 in connection with *Chloridia*, the last masque Jonson was permitted to write. Jonson attacked Jones in his poem *An Expostulation with Inigo Jones*; brought him on to the stage as In-an-in-Medlay in *A Tale of a Tub* (1633), and satirized him in his entertainment *Love's Welcome at Bolsover* (1634).

Jones took a prominent part in the restoration of Old St. Paul's (1633). He had to pay heavy fines to the Parliamentary party during the Civil War, and died in comparative poverty.—Cf. Peter Cunningham, *Inigo Jones: a Life of the Architect*.

JONES, John Paul, a commander in the American naval service, was born in Kirkcudbrightshire, Scotland, in 1747, died 18th July, 1792.

His father, whose name was John Paul, was gardener to the Earl of Selkirk. He entered the merchant service, was engaged in the American and West Indian trade, and is said to have realized a handsome fortune. On the outbreak of war between the colonies and the mother country he offered his services to the former, and in 1778, being then in command of the *Ranger*, he made a descent on Whitehaven, set fire to the shipping, and plundered the Earl of Selkirk's mansion.

Next year, in command of the *Bon Homme Richard* (42 guns) and a small squadron, he threatened Leith, and captured the British sloop of war *Serapis* after a fierce engagement off Flamborough Head. On his return to America he was somewhat neglected by Congress, and in 1788 entered the Russian service with the rank of rear-admiral, but, owing to the jealousy of Russian commanders, soon retired from this service. He returned to Paris, where he died in poverty and ill-health.—Cf. R. M. Crawford, *The Sailor whom England Feared*.

JONES, PAUL, a dance, popular in modern dance-halls. It begins like a game, with the dancers joining hands and forming two separate circles of men and women, facing each other. When the music stops it is the signal for the men to claim their *vis-à-vis* as partners.

JONES, Sir William, an English lawyer and Oriental scholar, born in 1746, died at Calcutta in 1794. He was educated at Harrow and Oxford, and early acquired a reputation as a linguist, Hebrew, Persian, Arabic, and even Chinese, besides German, Italian, French, Spanish, and Portuguese, being amongst his acquisitions. In 1770 his translation (in French) of the *Life of Nadir Shah* from the Persian appeared; in 1771 his *Grammar of the Persian Language*; in 1774 his *Poeseos Asiaticæ Commentariorum, Libri Sex*; and in 1781 his translation of the seven Arabic poems known as the *Moallakat*.

He had been called to the Bar in 1774, and in 1783 was nominated judge in the supreme court of judicature, Bengal, and knighted. Here he did much for the furtherance of Oriental studies, being one of the first Europeans to study Sanskrit, founding the Royal Asiatic Society, translating the *Sakuntala*, or *The Fatal Ring*, and the *Ordinances of Manu*, besides tales, poems, and extracts from the *Vedas*. He also undertook a Digest of the Hindu and Mahommedan Laws, which he did not, however, live to complete.

JÖNKÖPING (yeun-cheup'ing), a town of Sweden, capital of the län of same name, between Lakes Vettern and the Munksjö, which are connected by canal. The match manufactory is one of the largest of its kind. Pop. 29,556.

JONQUIL (jon'kwil), a bulbous plant of the genus Narcissus (*N. Jonquilla*), allied to the daffodil. It has long lily-like leaves, and spikes of yellow or white fragrant flowers. The sweet-scented jonquil (*N. odōrus*), a native of Southern Europe, is also generally cultivated. Perfumed waters are obtained from jonquil flowers.

JONSON, Benjamin, English dramatist, poet, and literary dictator, was born at Westminster in 1572, and died on the 6th Aug., 1637. Jonson's father, who, after being a sufferer in the Marian persecution, had become a minister, died before the poet was born, leaving his wife in straitened circumstances.

Jonson was educated at Westminster School, owing, it is believed, to the kindness of Camden, who at that time was an assistant master there. It is a pious article of belief that Jonson continued his studies at St. John's College, Cambridge, but there is no actual proof of this, and if Jonson was in residence at all, it can only have been for a few weeks.

Jonson's mother had re-married about two years after the birth of her son; her second husband was a master-bricklayer, and Jonson was put to work with him. He did not like this employment, so enlisted in the army and went to the Low Countries, where the English troops were fighting the Spaniards. He killed an enemy in single combat and took *opima spolia* from him.

He soon returned to England, and began to work for the Admiral's company of actors both as playwright and actor. Some of his early plays were probably written in collaboration and were regarded by their author as hack-work, and so are not preserved. Meres in his *Palladis Tamia* (1598) mentions Jonson among the best for tragedy; but his early tragedies are lost.

On 22nd Sept., 1598, Jonson killed a fellow-actor, Gabriel Spencer, in a duel; he was almost hanged for this breach of the peace, only escaping by benefit of clergy. He forfeited his goods and chattels, and was branded on his left thumb with the Tyburn T. During his imprisonment he became a Papist, and so continued for twelve years.

In 1598 the first of Jonson's great plays, *Every Man in his Humour*, appeared at the Globe. Shakespeare was one of the cast, and there is a strong

tradition that the play was accepted owing to his intervention. This play is of the greatest importance in English dramatic history, and is in itself an amusing and spontaneous play, which its author was not able to surpass for some seven years.

Its companion piece, *Every Man out of his Humour* (1599) is much less pleasing. There is an undercurrent of bitterness running through it, and its humorous characters are caricatures of impossible persons. It has, however, several amusing scenes.

Cynthia's Revels, performed in 1600 by the children of the Queen's Chapel, is an unsuccessful return to Lylyesque allegorical comedy. It is very long, and has lost any sparkle which it ever possessed. *The Poetaster* (1601) is a much livelier play. It is a counter-attack upon Dekker and Marston, the latter of whom had already represented Jonson on the stage. It ends with a highly comic scene, borrowed from the *Lexiphanes* of Lucian, in which Marston vomits up all his crudities of diction.

Jonson was disappointed with his success as a writer of comedies, and resolved to transfer his attentions to tragedy. *Sejanus* (1603) is the result. It is a very carefully written tragedy, which adheres most scrupulously to Tacitus and the other authorities, but it has little action, and fails to give almost everything that is required in a tragedy. A similar verdict may be given upon the other tragedy, *Catiline* (1611), where Jonson had a somewhat better subject, and treated it if anything less adequately.

In 1605 Jonson returned to comedy; he collaborated with Chapman and Marston in a play called *Eastward Ho*. This play was considered by a sensitive follower of King James I to contain some unpardonable aspersions upon the Scottish nation. The three authors were imprisoned, Jonson, whose share in the play was a small one, voluntarily surrendering himself. The report was that they were to have their ears and noses cut, but they were released unpunished.

In this same year Jonson's masterpiece *Volpone* was acted both at the Globe and at the two Universities. It is a scathing satire on greed and avarice, based in part upon some incidents in the *Satiricon* of Petronius. It is a well-constructed and marvellously clever play, but its subject is repellent, and there is no elementary goodness of heart in any of its characters.

Epicoene, or the Silent Woman appeared in 1609; it is a masterpiece of farce, rather too absurd to be classed as comedy. It is perhaps the best-tempered of all the plays, and is well-constructed; though, being based upon a trick, it must have been more effective when new than it could be after the trick is known. *The Alchemist* (1610) is another masterpiece; it is a comedy dealing with cheats and gulls, and satirizing greed and lust.

The last of the great plays is *Bartholomew Fair* (1614), a crude and realistic farce, which depicts low life in London with admirable, if sometimes unsavoury, fidelity. *The Devil is an Ass* (1616) marks a distinct decline. In it Jonson harked back to some features of the old morality-play, and though there is an amusing satire upon the 'projectors' of the time, the play as a whole is neither well-constructed nor witty.

He did not write any more stage-plays until 1625, when *The Staple of News* appeared. It is an unsuccessful attempt to mix allegory and Aristophanic comedy. Swinburne praised it excessively, but it has not many other admirers.

The New Inn, produced in 1629, was a complete failure, and was not heard to the end. It is a play with a romantic plot more absurd than can be easily imagined. There are passages of fine writing in it, but as a whole it is marred by extravagance and improbability. *The Magnetic Lady* (1632) was intended to complete the cycle of plays dealing with 'humours,' but it is a feeble play in comparison with its companion pieces.

A Tale of a Tub (1633) is the last of Jonson's plays, though there is some reason to suppose that it is a youthful production of Jonson's which he refurbished in his old age. It is a good straightforward rustic farce with no pretence to depth, but much less tedious than the plays of Jonson's old age.

When Jonson died, in 1637, he left two dramatic fragments behind him, one the beautiful pastoral play of *The Sad Shepherd*, of which nearly three acts survive, and the other a small fragment of seventy lines of a tragedy on *The Fall of Mortimer*. *The Sad Shepherd*, in spite of occasional lapses of taste, and displays of artificiality and *simplesse*, is a marvellous play, and has a rich vein of poetry and fancy in it. It makes us revise some of our opinions about Jonson. The fragment of *Mortimer* does not make us feel any regret that it was not completed. This concludes the tale of Jonson's dramatic work.

From 1605 to 1630 Jonson wrote many masques for performance at court. He was the principal masque writer of his time; if he did not invent the masque, he certainly brought it to perfection; after his death it fell into

decay. Masques were in the main shows designed to display the expensive dresses and elaborate dances of the noble lords and ladies who performed in them.

They did not give much scope to the librettist, and Jonson's masques do not rise above the level of mediocrity as poetry, though as masques they are the best we have. The best-known among them are: *The Masque of Queens* (1609), *Love Restored* (1611), and *News from the New World Discovered in the Moon* (1621). Jonson also wrote several 'entertainments,' which were in some respects akin to masques, but not identical with them, their central feature being a speech of welcome, not a dance.

Jonson wrote a large quantity of verse of various kinds—epigrams, addresses, lyrics, elegies, and epistles; none of it, however, is of great importance, though much of it is well-expressed and weighty. Jonson had not the lyric touch—his best-known song, *Drink to me only with thine eyes*, being quite exceptional, as well as being based on some passages in the *Letters* of Philostratus. Some of his poems appeared under the title of *Epigrams* and *The Forest* in the folio edition of his works which was published in 1616. Others, under the title *Underwoods*, appeared in the 1640 folio.

Jonson left two incomplete prose works behind him when he died. One was *Timber, or Discoveries made upon Men and Matter*, which was long thought to be a series of somewhat disjointed but original essays, and which was extravagantly eulogized by Swinburne as such. It has now been carefully analysed, and appears to have been a sort of common-place book in which Jonson noted down passages which appealed to him, sometimes translating or adapting from the classic, and sometimes from contemporary classical scholars. The other work is an incomplete *English Grammar*, based closely on Lily's *Latin Grammar*, and interesting chiefly as illustrating the self-conscious nature of Jonson's craftsmanship.

The facts of Jonson's life during his prime and his old age may be briefly stated, as for the most part he led the uneventful life of a scholar and author. He went to France as tutor to Sir Walter Raleigh's eldest son in 1613. He journeyed to Scotland on foot, leaving London probably about June, 1618, and starting on his return journey on 25th Jan., 1619. He spent a fortnight or so in Dec., 1618, at Hawthornden with the poet William Drummond, who wrote notes of his conversations with Jonson, which, though somewhat desultory, remain the chief authority for many events in Jonson's life. These *Notes* were only published in a garbled form until 1842, when an edition of them was brought out by David Laing, who discovered a copy of the original version of the *Notes* in the handwriting of the antiquary Sir Robert Sibbald.

In 1619 Jonson was created an M.A. of Oxford; in 1628 he succeeded Middleton as City Chronologer. In spite of an overwhelming tradition to the contrary, firmly embedded in all textbooks, Jonson was never Poet Laureate *de iure*; *de facto* he occupied a position somewhat equivalent to it. During his later years Jonson gathered round him many young men who loved to be called his sons, and he reigned as *dictator perpetuus* over a sort of club which met in the Apollo Room of the Devil Tavern.

He was long in ill-health, suffering from dropsy, scrofula, gout, and paralysis. After his death he was buried in the north side of the nave of Westminster Abbey, and the inscription, 'O rare Ben Jonson' was cut on his slab by the order of a casual visitor.

Jonson is perhaps the greatest of all the Elizabethans after Shakespeare, and yet his plays are seldom read and never acted. His qualities arouse admiration rather than enthusiasm. He was a titanic workman with a strong sense of his own importance and an ever-present idea of the sacred nature of his mission as a poet. He lacked the divine fire, and so was not successful in much of his work, though no one else has so nearly taken the kingdom of poetry by storm.

His work is quite devoid of charm, whimsicality, and the capriciousness of the Comic Muse. The saving grace of nonsense rarely comes to his rescue. Yet he is a colossal figure in English letters, and is always wise and weighty in his thought. Above all, he is transparently honest, delightfully uncompromising, and unflinchingly manly in everything that he wrote.—BIBLIOGRAPHY: M. Castelain, *Ben Jonson: l'homme et l'œuvre*; G. Gregory Smith, *Ben Jonson* (English Men of Letters Series); A. C. Swinburne, *A Study of Ben Jonson*; J. A. Symonds, *Ben Jonson* (English Worthies Series); Sir A. W. Ward, *History of English Dramatic Literature*.

JOPLIN, city of Missouri, United States, with rich lead- and zinc-mines and smelting-furnaces. It was founded in 1838, and became a city in 1873. Pop. (1930), 33,454.

JORDAENS (yor'dăns), **Jakob**, historical and portrait painter, born at Antwerp in 1594, died 1678. He studied under his father-in-law, van Noort, as did Rubens, and has the reputation of being, after Rubens,

Antwerp's greatest painter. His pictures, the subjects of which are mainly, mythological or scenes from contemporary Flemish life, are to be found in the chief European collections. He has the same realism, rich colour, and technical mastery as Rubens, but lacks his imaginative power and dynamic energy.

JORDAN, the largest river in Palestine, and one of the most celebrated rivers in the world. It rises from several sources, uniting in Bahr-el-Hûleh, or the Waters of Merom. From this point it flows with a rapid current in a narrow rocky bed, and falls after a southerly course of about 10 miles into Lake Tiberias. Shortly after leaving the south end of this lake it enters a broad valley or *ghor*, called in the Bible 'the plain'; and continuing a southerly but singularly crooked course of about 70 miles direct distance, or 200 including windings, falls into the north end of the Dead Sea, having received the Zerka or Jabbok, also on the left, and numerous smaller affluents.

The upper part of the valley of the Jordan is hilly, arid, and barren, but it becomes more level and fertile as it approaches the Zerka. The river is muddy and full of small fish. In the dry season it is shallow, with an average width of from 30 to 50 yards. At its mouth it is about 180 yards broad and about 3 feet deep. It is subject to great inundations during the winter season.

The valley of the Jordan forms one of the most remarkable depressions in the world, the Dead Sea being 1,312 feet below sea-level, and the total fall of the river being about 2,300 feet.—Cf. Sir G. A. Smith, *Historical Geography of the Holy Land.*

JORNAN'DES (properly *Jordanes*), the historian of the Goths, and himself a Goth, was born about A.D. 500, was at first a notary, but afterwards took the monastic vows, and is said to have been appointed bishop of some Italian city, probably Ravenna or Croton. Of his two works the chronicle *De Regnorum et Temporum Successione* is of value only when it approaches his own time. The other work, *De Rebus Geticis*, treating of the Goths, based on the lost history of Cassiodorus, is invaluable.

JOSEPH, one of the two sons of the patriarch Jacob by his favourite wife Rachel. His father's preference for him drew down the enmity of his elder brothers, who sold him to some Ishmaelitish slave-dealers, by whom he was sold to Potiphar, a distinguished officer in Egypt. The story of his elevation to the position of Vice-Regent of Egypt and the settlement of his father and brothers there is well known (*Gen.* xxxvii–l). Authorities still differ as to the period in Egyptian history to which Joseph's life belongs, some placing it before, others under, and others after the time of the Hyksos or shepherd kings.

JOSEPH, the husband of Mary the mother of Jesus, was a descendant of the House of David though resident at Nazareth, where he followed the trade of a carpenter. Early tradition represents him as an old man at the time of his marriage, and he seems to have died before the commencement of the public ministry of Jesus. His day in the Roman Catholic calendar is the 19th March.

JOSEPH I, Emperor of Germany, eldest son of Leopold I, born 1678; became emperor in 1705. He was a zealous member of the alliance against France in the War of the Spanish Succession, in which the victories of Marlborough and Eugène won glory for the imperial arms. He died in 1711.

JOSEPH II, Emperor of Germany, son of Francis I and Maria Theresa, was born 13th March, 1741, and died in 1790. He was elected King of the Romans in 1764, and on the death of his father (1765) German Emperor, succeeding his mother, however, in the hereditary estates of the House of Austria only in 1780. He at once commenced an extensive scheme of reforms, but the country was not prepared for such sudden changes, and he was compelled to give up most of his plans. In 1788 he visited Catherine II at Kherson, and in league with her made war unsuccessfully against Turkey.

JOSÉPHINE (zho-sā-fēn), Empress of the French, was born in Martinique 23rd June, 1763, the daughter of Lieutenant Tascher de la Pagerie, and died 29th May, 1814. She married in 1779 Vicomte Alexandre Beauharnais, by whom she had two children, Eugène and Hortense (afterwards Queen of Holland and mother of Napoleon III). In 1794 her husband, who had been commander of the army of the Rhine, was executed during the Reign of Terror. She herself had a narrow escape, having been proscribed.

At the house of the famous Madame Tallien she met Napoleon Buonaparte, a young artillery officer who had distinguished himself at the siege of Toulon, and they were married in 1796. Her beauty and grace of manner greatly assisted her husband in the establishment of his power, and when she shared his throne, from 1804 to 1809, her court was brilliant, if extravagant.

But the fact that the union was

childless stood in the way of Napoleon's ambition to become the founder of a dynasty, and in 1809 Joséphine was divorced, retiring to her beautiful seat of Malmaison, retaining the title of empress, with an annual grant of two million francs.—BIBLIOGRAPHY: P. W. Sergeant, *The Empress Josephine*; F. Masson, *Josephine: Empress and Queen*; N. J. E. Méneval, *The Empress Josephine*; A. Dumas père, *Mes Mémoires*, Vol. I.

JOSEPH OF ARIMATHÆA, i.e. of Ramathaim in Benjamin, a member of the Jewish Sanhedrin, who, though a believer in Jesus, had not the courage to make open profession of his faith. Nevertheless, after the crucifixion he went to Pilate, begged the body of Jesus, and along with Nicodemus buried it in his own garden. According to tradition, he came as apostle to England, whither he brought the Holy Grail, and settled at Glastonbury.

JOSE'PHUS, Flavius, the historian of the Jews, was born at Jerusalem A.D. 37, and was carefully educated. He spent three years in a desert with the hermit Banus, and adopted the views of the Pharisees. In A.D. 63 or 64 he was sent on a mission to Rome, to treat for the release of certain Jews sent in custody to the capital by the procurator Felix.

On his return he found his countrymen preparing to throw off the Roman yoke, and, having tried in vain to persuade them of the hopelessness of such a struggle, he accepted the post of defending the province of Galilee, and actually held the fortified town of Jotapata against the whole Roman army for forty-seven days.

He was captured at the fall of the city, was afterwards present in the Roman army at the destruction of Jerusalem (A.D. 70), and went with Titus to Rome, where, assuming the family name of his patron, Flavius, he lived in learned leisure. Here he wrote (in Greek) *The History of the Jewish War*; *The Antiquities of the Jews*, giving a history of the Jews from the earliest times to the reign of Nero; an *Autobiography*, mostly relating, however, to the time of his military activity; a work on the *Antiquity of the Jewish People*, directed against Apion, an Alexandrian grammarian. The date of his death is uncertain. He certainly saw the end of the century.—Cf. E. Schürer, *History of the Jewish People in the Time of Christ*.

JOSH'UA, the successor of Moses in the command of the Israelites, was the son of Nun, of the tribe of Ephraim. His name was at first *Hoshea* (help), but was changed by Moses into *Joshua* (Jehovah's help), of which *Jesus* is the Greek form. He was the only one, with the exception of Caleb, who brought back an encouraging report from the land of Canaan. Nominated by Moses to succeed him in the command of the army of Israel, he led the Israelites over the Jordan, and in the course of seven years conquered the greater part of Palestine, and divided the country among the tribes.

He died at Timnath-Serah in Mount Ephraim at the age of 110. His history is contained in the canonical book which bears his name, and of which he has been usually regarded as the author; but modern critics have shown that it is a composite narrative, and contains references to many events which took place after Joshua's death.—Cf. Dillmann's *Commentary*.

JOSI'AH, King of Judah, succeeded his father Amon at the age of eight years (639 B.C.). He is characterized in the Scriptures as doing "that which was right in the sight of the Lord." He took an active part in the reform of public worship, and commenced the restoration of the temple, during the progress of which the high-priest Hilkiah discovered the book of the law, thought by some to be substantially the same as the *Book of Deuteronomy*. The prescriptions it contained gave a decided direction to the reform movement which the king conducted with great vigour.

In his thirty-first year, prompted probably by friendship to the King of Assyria, he marched out against Pharaoh Necho, who was on his way to attack that kingdom. The two armies met at Megiddo, where Josiah was slain.

JÓSIKA (yō'shi-kȧ), **Miklós, Baron,** a Hungarian novelist, born in 1796, died at Dresden in 1865. He entered the Austrian army, but in 1818 resigned his commission, and settled down to literary work. Drawn into politics, he became a zealous supporter of Kossuth, and during the Revolution of 1848 was a member of the Committee of National Defence.

On the fall of the revolutionary Government he escaped to Brussels, where he resided till 1864. Amongst the best of his novels are: *Az utolsó Bátori* (The Last Batori); *Zrynі a Költö* (Zrvni, the Poet); and *A' Csehek Magyarországban* (The Bohemians in Hungary). Jósika was the founder of the historical novel of his country.

JOTUNS (yō'tunz; Icel., giant, devourer), in northern mythology, immense giants and magicians who had command over the powers of nature, and lived in dark caves in their kingdom of Jotunheim, from

which they waged perpetual war against the Æsir, the bright gods of Valhalla. Originally they represented the destructive forces in nature. They were cunning, malignant, versed in witchcraft, but not highly intelligent.

JOUBERT, Barthélemy Catherine, French general, born 1769, died 1799. The son of an advocate, Joubert was intended by his parents to follow his father's profession, and when he ran away to join the artillery, in 1784, he was immediately brought home, and eventually commenced the study of law at Lyons and at Dijon. In 1791 he enlisted in a volunteer corps, where his comrades elected him corporal and then sergeant, and he was promoted to a sub-lieutenancy in 1792.

His brilliant defence of a redoubt against a whole battalion when only thirty men of his garrison were left alive, and in which engagement he was made prisoner by the Austrians, found him great favour in the eyes of Bonaparte, who, in 1795, made him a general of brigade. After his release on parole, while serving under Augereau in 1796, he became a general of division, and in Jan., 1799, he was made commander-in-chief. He fell among the first, mortally wounded, at the battle of Novi, 5th Aug., 1799.

JOUBERT, Petrus Jacobus, South African general, born in the Cape Colony in 1834, and died at Pretoria on 28th March, 1900. He removed to the Transvaal, where he became member of the Volksraad and then Attorney-General. During the first British annexation of the Transvaal he refused to hold office, and played a great part in the agitation that led to the war of 1880, when he became commandant-general of the Boer army. In 1893 and again in 1898 he unsuccessfully opposed Kruger in the presidential elections. He was commandant-general in the second Boer War till his death.

JOUFFROY (zhö-frwä), **Théodore Simon,** a French philosopher, born in 1796, died at Paris in 1842. He was educated at the Colleges of Pontarlier and Dijon, and then studied under Victor Cousin. In 1817 he became a doctor of philosophy, and held the position of professor of philosophy in different colleges and normal schools; taught for some years in the Collège de France, and became a member of the Academy.

In philosophy Jouffroy was mainly a follower of the Scottish school of Reid and Stewart, some of whose works he translated into French. His own principal works are *Mélanges Philosophiques* and *Cours d' Esthétique.* As an original thinker Jouffroy has no claim either to profundity or intellectual brilliancy, but he had a talent for popular exposition, and followed prudent lines of speculation.

JOULE, James Prescott, celebrated English physicist, born at Salford 1818, died 1889. His name is associated with some of the most important facts of physical science, and every student of natural philosophy is familiar with *Joule's Mechanical Equivalent of Heat* (usually denoted by the letter J), *Joule's Law of Heating* in an electric circuit, *Joule's Law* in thermodynamics, and the unit of energy called the *Joule.*

His discovery of the law of heating in an electric conductor, viz. that the heat evolved in a given time is proportional to the resistance of the conductor, multiplied by the square of the current, was announced in 1840.

At the meeting of the British Association in 1843 he read a paper *On the Calorific Effects of Magnetic Electricity and the Mechanical Value of Heat,* but his remarkable results attracted little attention. Even at the 1847 meeting, when he returned to the subject, his communication would again have fallen flat, had not a young man of twenty-three risen among the audience and declared his emphatic opinion that Joule had brought before them "a great truth, and a great discovery, and a most important measurement." The young man was William Thomson, afterwards Lord Kelvin.

It was years after this, however, before Joule's views and results, of foundational value though they are in modern mechanical, electrical, and chemical science, came to be generally accepted by physicists and engineers.

Joule's final result was that "the quantity of heat capable of increasing the temperature of a pound of water (weighed in vacuo, and taken at between 55° and 60° F.) by 1° F. requires for its evolution the expenditure of a mechanical force represented by the fall of 772 lb. through the space of 1 foot." This value for the constant J was not improved upon for nearly thirty years. The number at present accepted is 778, instead of 772 (*see* HEAT; Kaye and Laby, *Physical and Chemical Constants*).

Joule held no academic post, and carried out his experiments in his private laboratory. He was elected a Fellow of the Royal Society in 1850. He was awarded the Royal Medal of the Society for 1852, and the Copley Medal in 1860. In 1878 he was granted a Civil List pension of £200. His scientific papers (2 vols) were published in 1885 and 1887.

JOURDAN (zhör-dän), **Jean Baptiste, Count,** marshal and peer of

France, born 1762, died 1833. He distinguished himself under Dumouriez, was made a general of division in 1793, defeated the Austrians at Wattignies and at Fleurus, drove them beyond the Rhine, and took the fortress of Luxembourg, but was defeated at Höchst, and again at Würzburg (1796).

In 1799, the Directory having given him the command of the army on the Danube, he crossed the Rhine at Basel, but was encountered by the Archduke Charles, who completely defeated him at Stockach. In 1803 he became a member of the Senate, and in 1804, on the establishment of the Empire, obtained the rank of marshal, the title of count, and a seat in the Council of State. After the Restoration he was raised to the peerage. He entered with spirit into the Revolution of 1830. His works include *Mémoires pour servir à l'histoire de la campagne de* 1796, and *Opérations de l'Armée du Danube.*

JOURNALISM has undergone great changes in the past thirty or forty years, and has become more definitely a means of mirroring the daily life and doings of the people. Its increased importance in our national life is the direct result of free education. To-day everybody can read, and most people are eager to keep in touch with movements of world-wide, national or local importance. In presenting the news of the day the journalist and his newspaper become instruments of publicity, almost indispensable as agencies aiding Governments and administrative authorities.

The range of news is wider to-day than at any time in the world's history. Public amusements, the sports and recreations of the people, records of athletic and scholastic achievements, inventions, discoveries, explorations, industrial and economic conditions, politics, law, crime, and religion, as well as personal gossip about men and women of note or passing interest, all claim their share of space in the columns of the daily and weekly newspapers. Inventions have made it possible to transmit news across countries and round the world with greater speed, and to increase enormously the running speed and output of giant printing machines.

A few large firms own several provincial newspapers, each linked up in a great organization with one or more London papers. The power in the hands of these large controllers is considerable, especially in political education and propaganda. This is a factor recognized by statesmen and politicians of all parties, who naturally seek to utilize the great channels of publicity.

In addition to the general newspapers—morning, evening and weekly—including those dealing specially with finance and sport, there are journals for the nursery, magazines for elementary school-children, periodicals of fiction and light reading matter for boys and girls, a representative array of trade, technical and commercial journals, and many religious, political and literary newspapers and reviews. There are also several great news-supply agencies.

A range of tastes and interests so wide reveals the scope and required qualifications of men and women who earn their livings in editorial work. A marked tendency of journalism in recent years has been specialization and the sub-division of labour. A newspaper staff is a co-operative group of specialists; they work in sections, but not in 'water-tight' compartments. 'Contact' is the daily keynote. High-speed shorthand is essential for reporters on provincial daily and weekly newspapers and the news agencies; it is needed also for reporters in the Law Courts and the Parliamentary Gallery. Editors of London newspapers do not insist on it absolutely for reporters on crime or other special investigation work, but it is always of value. Although fewer speeches are reported verbatim nowadays, compared with thirty or forty years ago, it is often important that the reporter should seize upon and record faithfully, in the 'first person,' a telling phrase or significant declaration in a conversation 'address' or sermon. Sub-editors have less use for shorthand, but among these—the men who prepare the 'copy' for the printers, write attractive headlines and plan the make-up of pages—there is need for more specialization and for wide and varied knowledge, especially of geography, industry and sport. They must also write good English, and know something about the law of libel and contempt of court. Their work is full of snares and risks.

Journalism has been defined as "The writing and presentation of news, comment and opinion in newspapers or other periodical publications." It is the profession for those who can look at life and the events of the day, and write of them in such a manner as to interest, amuse, or instruct the public. It is a profession which should be entered with the eyes wide open, for the pitfalls are many, and the competition is intense.

The safest method of ensuring a steady income is to obtain a post on a newspaper or periodical, and here the openings for women are steadily increasing; most papers require at least one woman on their permanent

news staff, in addition to women on the Home or Features pages. A London paper, as a rule, does not care to take on its staff any one who has not been trained on a provincial paper, while some provincial papers recruit their staffs from boys and girls who have just left school, and train them on the paper, beginning with office work.

In post-war years more recruits have entered journalism from public schools and universities. The University of London provides a special two-years' course for students of journalism, and grants a diploma on the result of examinations, which include tests in practical work. Bristol also gives courses in journalism and there is a movement for external students at other universities or an extension of the work in London beyond the rooms of the allied colleges. Great Britain is behind the United States in such organization of special studies. The school of journalism at Columbia University, New York, is regarded as a model for the world.

Several societies exist to protect the interests of journalists. These include the National Union of Journalists, the largest organization of working journalists in the world, the Institute of Journalists, established in 1884, and the Society of Women Journalists. Most European countries have their organizations, and those in countries which have a free press—not controlled by the Government—are affiliated, like the National Union in this country, with the International Federation of Journalists, which has great ideals and a Court of Honour.

Schedules of wages, holidays, and hours of labour in Great Britain have been secured, and are watched over, by the National Union of Journalists after negotiations with the Newspaper Proprietors' Association, the Newspaper Society, and the news agencies. Staff reporters and sub-editors with three years' experience on London national newspapers are entitled to a minimum rate of £9 9*s.* a week (except on financial and sporting papers, where the minimum rate is £8 8*s.*). Many staff men are paid higher rates, in recognition of ability and service. Editors, leader writers and specialists receive "upwards of £1,000 a year." This is a moderate statement.

The Union scale in the provinces varies according to the population of the town. Weekly minimum rates on dailies range from £5 3*s.* to £5 15*s.*, with higher recognized office or city minima in some cases. Provincial weekly rates are £4 7*s.* 6*d.* (£4 13*s.* 6*d.* where dailies are published). There is also an agreed graduated scale for juniors. News agency rates provide an eight guineas' minimum, with fixed rates for correspondents' messages. In London there are minimum rates for spacemen and staff photographers on national newspapers. The Union has also secured a "recommended" scale for staffs of trade and class periodicals, where organization has lagged behind that of newspaper staffs.

In the establishment of minimum rates of pay and maximum hours of work by legal enactment, the Australian Journalists' Association has led the way. Its schedules are fixed and enforced by the Courts.

Free-Lance Journalism is precarious, and for the people who handle 'news' and 'features' the opportunities are strictly limited. The outlook is more favourable in fiction writing (which cannot legitimately be described as journalism) and in certain specialized branches, but the competition is severe from the large numbers of people to whom such writing is a spare-time occupation. In this kind of work a woman can compete on equal terms with her men colleagues, while she has the monopoly of certain subjects. Payment varies from 15*s.* per thousand words to a very much higher figure, according to the class of paper, the value of the article and the reputation of the writer. (*See also* NEWSPAPERS.)

The principal organization for the relief of journalists in need is the Newspaper Press Fund, 11, Garrick Street, London. W.C.2.

JOVIA'NUS, Flavius Claudius, Roman emperor, was originally captain of the household troops of the Emperor Julian, whom he accompanied in the disastrous campaign against the Persians in which Julian lost his life (A.D. 363). After Julian's death he was proclaimed emperor by the troops, but could only extricate his army by ceding to the Persian monarch the five provinces beyond the Tigris. He was found dead in his bed when on his way to Constantinople (364).

JOWETT, Benjamin, English scholar, master of Balliol College, Oxford, born in 1817, died in 1893. He studied at Oxford, was elected to a fellowship in 1838, and became regius professor of Greek in 1855. In 1855 he published a *Commentary on the Epistles of St. Paul.* In 1860 appeared his *Essay on the Interpretation of Scripture* in the celebrated *Essays and Reviews*, for which he was tried on a charge of heresy before the Chancellor's court, but was acquitted.

In 1870 he became master of Balliol, and in 1871 published his most important work, a translation of the

Dialogues of Plato. He published translations of Thucydides (1881) and the *Politics* of Aristotle (1885). He was vice-chancellor of the university from 1882 to 1886.

JOWITT, Sir William Allen, English lawyer. Born in 1885, the son of a clergyman, he was educated at Marlborough and New College, Oxford. In 1909 he became a barrister and in 1922 he was elected Liberal M.P. for the Hartlepools. He lost his seat in 1924, but in 1929 he was returned to Parliament by Preston. He then joined the Labour party, was made Attorney-General and was knighted. He continued in the same office when the national government was formed in 1931, but failed to secure a seat in the House of Commons, and returned to his practice at the Bar.

JOYCE, James, Irish writer. Born in Dublin, 2nd Feb., 1882, he was educated at Clongowes and graduated at the Royal University. He wrote some verses, a play and a volume of short stories, *The Dubliners*, before he became widely known as the author of the extraordinary novel *Ulysses*, which was published in Paris.

JUAN FERNAN'DEZ, a group of islands in the Pacific Ocean, 33° 40′ s. by 80° w., belonging to Chile, and forming a part of Valparaiso Province. The main island, Mas-à-Tierra (or 'landward'), 13 miles long by 4 miles broad, is composed of rocks of volcanic origin and densely wooded, was discovered by the Spanish Captain Fernandez in 1565, and has a good anchorage on its northern side.

Alexander Selkirk, a Scottish seaman, was marooned here from 1704 to 1709, and his story is said to have inspired Defoe's *Robinson Crusoe*. Until 1913 the island was used as a Chilian penal settlement, and in 1914 a wireless station was established. Mas-à-Fuera (or 'seaward') Island has a wireless station, and Santa Clara or Goat Island, to the south-west, completes the group.

JUAREZ (*hu-à-reth'*), **Benito Pablo,** President of the Mexican Republic, born of Indian parentage in 1806, died in 1872. Elected President in 1861, he declared the suspension of public payments for two years to Europeans, a step which occasioned the interference of Britain, Spain, and France. Troops were landed in Mexico in 1862, but Britain and Spain retired, leaving Napoleon III to carry out his views alone.

The Archduke Maximilian of Austria came, on Napoleon's invitation, to assume the throne, but Juarez, in spite of defeats and losses, continued to head a resistance, and when Napoleon, under pressure from the American Government, withdrew his troops in 1866, the Republicans carried all before them. Maximilian was captured and shot, after a mock trial, on 19th June, 1867, and Juarez was re-elected to the Presidency (1867), which he held till he died.

JUBA I, a king of Numidia and Mauritania in the first century B.C. On the breaking out of the Civil War Juba fought against Cæsar; but after his total defeat at Thapsus, being abandoned by his subjects, he slew himself, 46 B.C.

His son, **Juba II,** was led in Cæsar's triumph at Rome, was carefully educated, and, having gained the favour of Augustus, received in marriage the daughter of Antony and Cleopatra, and was restored to the kingdom of his father, 30 B.C., which some years after he exchanged for Mauritania. He wrote a *History of Rome* in Greek, a *History of Arabia*, &c.

JUBA, a river of Italian Somaliland, East Africa, till 1925 the boundary between Kenya and Italian Somaliland. It is about 1,000 miles in length.

JUBALAND, formerly the north-east province of Kenya Colony, East Africa. By a Treaty of 1915 before Italy entered the European War, it was agreed that if, as a result of the War, Britain and France should gain territory in Africa at the expense of Germany, adequate compensation should be made to Italy. Thus by the Treaty of London (1924) Britain in 1925 transferred the major part of Jubaland to Italy. This area is known as Transjuba, and is administered as part of Italian Somaliland. Jubaland is an unproductive and partially unknown region.

JUBBULPORE. *See* JABALPUR.

JU'BILEE (Heb. *jobel, yobel,* blast of a trumpet), a festival of the Jews, held every fiftieth year. During this year all slaves or captives were released; all estates which had been sold reverted to their original proprietors or their descendants; and the ground was allowed to lie fallow. It has been doubted whether the law of jubilee was ever actually observed until after the return from the Babylonian exile, when, for a time at least, it came into operation.

JUDÆ'A, a term applied, after the return of the Jews from exile, to that part of Palestine bounded east by the Jordan and the Dead Sea, north by Samaria, west by the Mediterranean, and south by Arabia Petræa. *See* PALESTINE.

JUDAS, surnamed *Iscariot,* meaning, perhaps, the man of Kerioth, a village of Judæa, was one of the Twelve Apostles of Jesus, and be-

trayed his Master into the hands of the Jewish priests for thirty pieces of silver. Remorse for his crime led him to suicide. The Cainites, Cerinthians, and some other heretics held him in great veneration, believing that he alone saw the necessity for bringing about the fulfilment of prophecy and the atonement for humanity. Others have thought that his object was to oblige his Master to use His miraculous power to defeat His enemies and establish the new earthly kingdom of the Messiah, in which Judas expected to have a high place.

JUDAS, or **JUDE,** brother of James, one of the Twelve Apostles. Matthew and Mark call him *Thaddæus surnamed Lebbæus.* Nothing is known of his life. By many he is considered the author of the *Epistle of Jude.* *See* JUDE, EPISTLE OF.

JUDAS TREE (*Cercis Siliquastrum*), nat. ord. Leguminosæ, is a native of the Levant, Spain, south of France, Italy, &c. It grows to the height of about 20 feet, with pale-green leaves and beautiful purple flowers, which are eaten mixed with salad or made into fritters. *C. canadensis,* or redbud, another species, growing in Canada and the United States, is smaller.

JUDE, EPISTLE OF, one of the books of the New Testament. Its canonicity was questioned by the primitive Church, and often since. The Asiatic Churches did not make use of it till the fourth century, nor was it known in the West till towards the close of the second. Its quotation from the apocryphal book of *Enoch* raised a prejudice against it, but it was eventually allowed to take its place as a portion of the sacred canon. It is a passionate denunciation of heretics and false teachers, and has been supposed by some to be written by Judas the brother of the Saviour, and not by Judas the brother of James.

JUDGE (Lat. *judex*), in the widest sense one whose function it is to hear and decide causes and declare the law. In practice, however, the term is not generally applied to magistrates, justices of the peace, and other minor judicial functionaries.

Judges of the superior courts are appointed by the Crown, but are independent of it. They hold office for life or during good behaviour, and can be removed only on an address of both Houses of Parliament. Judges of the inferior (or county) courts are nominated by the Lord Chancellor, and may be removed by him for misconduct.

A judge of the High Court of Justice must have had ten years' standing at the Bar, whilst a judge of the Court of Appeal must have been a barrister for fifteen years or a judge of the High Court for one year. Inferior judges are barristers of at least seven years' standing. No judge may sit in the House of Commons.

In theory a judge has no concern with the making of the law, which is the function of the legislature (q.v.), but in actual practice, especially in less advanced communities, there frequently arise questions for which the law has made no provision, and the judge is called upon to determine them.

His decisions, especially if he is a superior judge, are followed in future cases, and indeed are binding on the lower courts, and consequently there results judgemade or 'case' law. Frequently a judge has also to determine the facts of a case, but in England this function is often assigned to a jury.

Superior judges are absolutely immune from the consequences of anything said or done by them in judicial proceedings. "It is a principle of English law that no action will lie against a judge of one of the superior courts for a judicial act, though it be alleged to have been done maliciously and corruptly." Inferior judges are privileged provided they do not act in bad faith or beyond their jurisdiction.

Generally, a judge must act when called on, but he may not do so if he has a personal interest in the case, unless it cannot be heard without him or the objection is competently waived. A common example of interest, objection to which is usually waived, is where a judge is a shareholder in a company which is a party to an action brought before him. *See* JUDGMENT; JURY; JUSTICIARY COURT; KING'S BENCH; SESSION, COURT OF; &c.

JUDGE ADVOCATE-GENERAL, an official subordinate to the Secretary of State for War, having an office in London, and advising the Crown upon all matters of military law. Proceedings of all military courts-martial are submitted to him for confirmation, and he has the power to annul, quash, or revise any finding or sentence which may not be legally in order. Subordinate officials form a contact between London and Head-quarters of Commands on home establishment. Duties of a similar nature are carried out for the Admiralty by a *counsel and judge-advocate* of the fleet.

JUDGES, BOOK OF, a canonical book of the Old Testament, so called because the greater part of the narrative is occupied with the history of the judges who were raised up to deliver their countrymen from the oppressions of their neighbours. The

first chapter, although formally connected with the *Book of Joshua* by the opening sentence, evidently contains a separate portion of the history of the Israelitish invasion of Canaan, the first settlement, indeed, west of the Jordan, in which the tribes of Judah and Simeon play a distinct part in the conquest.

The 6th verse of the 2nd chapter again connects the work with the concluding part of the *Book of Joshua*, and in the chapters which follow the history of the nation is written from an ideal and poetic point of view, which gives it unity, the judges being represented as successive rulers, although in most cases their history and influence were merely local.

The third part of the book begins at chapter xvii, and has no formal or chronological connection with what has gone before, and has sometimes been called an appendix.

JUDGMENT, in law, the judicial determination and decision of a court in an action. It is either interlocutory or final. In the former case it is given only on some particular point or proceeding, and does not complete the action in the same way as the final judgment, upon which, unless it be appealed against, suspended, or recalled, execution may follow. On a jury trial the verdict of the jury precedes the judgment, which is based on the verdict. The term judgment applies only to the adjudication of a court of law.

JUDGMENT-DEBT, in law, a debt secured to the creditor by a judge's order, and in respect of which he can at any time attach the goods and chattels of the debtor.

JUDICIAL COMMITTEE OF THE PRIVY COUNCIL, an English tribunal for the disposal of appeals from dominion, colonial, and ecclesiastical courts. The Judicial Committee was established by an Act in 1833, amended in 1887, 1908, and 1913. Its present constitution dates from 1928. It consists of members of the Privy Council who are or have been judges in the highest courts, including the Lord Chancellor, lord chief-justices, judges, masters of the rolls, and also judges from the oversea Dominions, and two judges versed in Indian law.

JUDICIAL SEPARATION, in English law, by the Supreme Court of Judicature Consolidation Act, 1925, founded upon the Matrimonial Causes Act of 1857, judicial separation may be obtained by either the husband or the wife, on the ground of adultery, cruelty or desertion without cause for two years and upwards, failure to comply with a decree restituting conjugal rights, or by the wife on conviction of the husband of aggravated assault. This may be granted by a court of summary jurisdiction.

With regard to cruelty the conduct complained of must be such as to have caused danger to life, limb, or health (bodily or mental), or to give rise to a reasonable apprehension of such danger. Habitual drunkenness may justify separation as may also persistent threats. A judicial separation places the wife in the position of a *femme sole* during the continuation of the separation, and if she die intestate, her property is dealt with as if her husband were dead. On the other hand, her husband is in no way liable for her contracts or torts; but if he has been ordered by the court to pay her alimony, he will be liable for necessaries supplied to her if he have failed to pay her alimony.

Of course, since the marriage is not dissolved, neither of them can marry again during the life of the other, judicial separation being merely divorce *a mensâ et thoro* (from board and bed), as distinguished from a full divorce *a vinculo matrimonii* (from the bond of marriage). In Scotland the law is very similar. The grounds of separation are adultery and cruelty, and condonation or forgiveness is a good defence.

JUDITH, widow of Manasses, a Jewish heroine of great beauty, virtue, courage and piety, whose history is given in the apocryphal book which bears her name, the author and age of which are unknown. Judith is represented as going out to the tent of Holofernes, an Assyrian general who was besieging Bethulia, the city in which she lived, charming him with her beauty, and taking advantage of the admission to his tent thus afforded to her, to cut off his head with his own sword while he slept.

JUEL (yu'el), **Niels,** a Danish admiral, born in 1629 at Copenhagen, died 8th April, 1697. He served in the Dutch navy under Tromp and De Ruyter against the English and the Moors of Barbary, entered the Danish service in 1656, was made admiral, took the island of Gothland from the Swedes in 1676, and defeated them the following year in the famous sea-fight in the Bay of Kjöge.

JUGGERNAUT, a corruption of the Skt. *Jagannâtha* (*jag-an-nät'ha*; 'Lord of the World'), the name given to the Indian god Krishna, the eighth incarnation of Vishnu, and to a very celebrated idol of this deity in a temple specially dedicated to Juggernaut at Puri, the modern provinces of Behar and Orissa, on the Bay of Bengal.

It is a very rudely-cut wooden image, having the body red, the face black, and the arms gilt; the mouth is open and blood-red; the eyes are formed of precious stones. It is covered with magnificent vestments and seated upon a throne between two others—his brother Bala-Rama and his sister Subhadra, coloured respectively white and black.

Great numbers of pilgrims, sometimes a hundred thousand, at the time of the festivals of Juggernaut, assemble from all quarters of India to pay their devotions at his shrine. On these occasions the idol is mounted on a huge car resting on sixteen wheels, which is drawn by the pilgrims; and formerly, it is said, people were wont to throw themselves under the wheels, to be crushed to death, believing that they would thus immediately enter heaven. In this way the sinister associations of the word have arisen.

These religious suicides have made the name of Juggernaut famous in the Western World. The practice, however, is now of rare occurrence; and indeed competent authorities maintain that such deaths were always accidental.—Cf. Sir W. W. Hunter, *Orissa*.

JUGLANDA'CEÆ, the walnut tribe, a natural order of dicotyledonous plants, chiefly found in North America. They are trees with alternate pinnate stipulate leaves, and unisexual flowers, the males in catkins, the females in terminal clusters or loose racemes. Besides the walnut the order includes the butter-nut and hickory.

JUGURTHA, a king of Numidia, a natural son of Mastanabal. Micipsa, his father's brother, and King of Numidia after Massinissa (149 B.C.), adopted him, and brought him up with his own sons, Adherbal and Hiempsal. Micipsa did his best to conciliate him, and declared him joint heir to the crown with his two sons. But after the death of Micipsa, Jugurtha had Hiempsal murdered and drove Adherbal from the country. Adherbal appealed to Rome, and after several Roman expeditions into Numidia, Jugurtha was captured (106 B.C.), led in the triumph of Marius at Rome, and finally thrown into a dungeon, where he was starved to death.

JU'JUBE, the popular name of a genus of spiny and deciduous shrubs or small trees, genus Zizyphus, nat. ord. Rhamnaceæ. The species are numerous, and of several the fruit, which is blood-red or saffron-coloured with a sweet granular pulp, is wholesome and pleasant to eat. The common jujube (*Z. vulgāris*) is a native of Syria, from which it was introduced into Europe. The fruit is dried, and forms an article of commerce.

Z. Lotus, which some believe to have given name to the ancient Lotophagi, or Lotus-eaters, mentioned by Homer (*Odyssey*, ix, 84), a shrub 2 or 3 feet high, is a native of Persia and the north of Africa. *Z. spina Christi*, or Christ's Thorn, is said to have furnished the branches of which our Saviour's crown of thorns was made.—The name jujube is also given to a confection made of gum-arabic or gelatine, sweetened and flavoured so as to resemble the jujube fruit.

JU-JUTSU or **JIUJITSU,** Japanese method of offence and defence without weapons in personal encounter. It was at first a secret art practised by the nobility, but later it developed into a national system of physical culture for both sexes, especially in the army, navy and police.

Early in the 20th century schools arose in Great Britain, Europe and the United States, usually under Japanese exponents, and demonstrations of jiujitsu were given in music halls and other public places. The system was studied by the London police and other forces. Using anatomical knowledge the defendant seeks, by certain locks, strangle holds and twists, to divert the adversary's muscular strength to his undoing.

JUJUY (*hu-hō'i*), a town of the Argentine Republic, capital of a province of same name, is situated in the Rio Grande, was founded in 1592, and carries on an active trade with Chile and Bolivia. Pop. 8,000.—The province has an area of 16,705 sq. miles, and a pop. of (1932), 97,491.

JULIA, the only child of the Emperor Augustus, was his daughter by his second wife Scribonia, and was born 39 B.C. She was first married (25 B.C.) to her cousin, the young Marcellus, and afterwards to Marcus Vipsanius Agrippa, to whom she bore three sons and two daughters. On Agrippa's death, in 12 B.C., she was married to Tiberius, who left her on account of her licentiousness.

Augustus banished her to Pandataria, a desolate island on the coast of Campania, ultimately allowing her to live in Rhegium. After the death of the emperor, Tiberius treated her with great severity. She died A.D. 14, in poverty and distress. Her son Agrippa had been put to death by Tiberius shortly before.

JULIAN, Flavius Claudius Julianus, a Roman emperor, whom ecclesiastical writers have surnamed the *Apostate*, son of Julius Constantius (brother of Constantine the Great), was born at Constantinople 17th Nov., 331. When hardly six years old, his father and

several members of his family were murdered by the soldiers of his cousin, the Emperor Constantius.

He was brought up in the Christian religion, but being fond of literature and philosophy, he turned away from the gloomy piety and rude asceticism of his teachers to the cheerfulness of the old Greek philosophers.

At the age of twenty he was a pagan at heart and a disbeliever in the divine origin of Christianity. The Emperor Constantius allowed him to go to Athens, where he gave himself up to philosophical pursuits and embraced paganism. Having received command of an army against the Germans, he defeated them at Strasbourg, and drove them beyond the Rhine. He also displayed great talent as an administrator in Gaul.

The emperor now became jealous of Julian, and recalled his best troops under pretence that he wanted to employ them against the Persians. This order caused a rebellion among the soldiers, who proclaimed their leader Julian emperor in March, 360, in spite of his own resistance. Constantius prepared to proceed against him, but soon after died, and Julian was generally recognized as emperor.

He began by putting a stop to many abuses, and limiting the splendour of his court, and was thus able to remit to the people the fifth part of all their taxes. He sought to restore the heathen worship in all its splendour, and on that account opposed Christianity as much as was in his power, without, however, persecuting the Christians themselves. He even sought to falsify the words of Christ by rebuilding the Jewish temple. In 363 he headed an expedition against the Persians, and took several cities, but was mortally wounded 26th June, 363.

He was an able ruler, and had also a reputation as an author. Some of his works have come down to us, including speeches, letters, and satirical pieces; the latter are distinguished for wit and humour. He wrote also a work against the Christian religion, of which we have yet some extracts. There is an English translation of his works in the Bohn Library, and another in the Loeb Classical Library. —BIBLIOGRAPHY: G. Negri, *Julian the Apostate*; A. Gardner, *Julian, Philosopher and Emperor* (Heroes of the Nations Series).

JULIEN (zhū-lē-aṇ), **Stanislas-Aignan**, the leading Chinese scholar of his day, was born at Orleans 1799, and died in 1873. Possessed of an extraordinary linguistic faculty, he taught himself Greek, English, Italian, Spanish, Portuguese, and German, and in 1823 commenced the study of Chinese under Abel Rémusat.

At the end of twelve months he published a Latin translation of the philosopher Mencius. Henceforth ancient and modern Chinese, Mantchu, the Mongolian tongues, and subsequently Sanskrit, were the subjects of his exact and profound study.

In 1832 he became professor of Chinese at the Collège de France; librarian at the Bibliothèque Nationale, 1839; president of the college, 1855; commander of the Legion of Honour, 1863. His most important work was entitled *Voyages des Pèlerins bouddhistes* (Paris, 1853–8). Among his other works are: *Industries anciennes et modernes de l'Empire chinoise* (1869); and *Syntaxe nouvelle de la langue chinoise* (1869).

JULIUS, the name of three Popes. —**Julius I**, born in Rome, chosen Pope in A.D. 337, died in 352. He summoned a council which approved his conduct in sustaining Athanasius in his contest against the Arians in 342.

Julius II (Giuliano della Rovere), was elevated by his uncle, Sixtus IV, to the rank of a bishop and cardinal, was appointed Papal legate to France, in 1503 was elected Pope, and died 1513.

Immediately on his elevation to the Pontificate he planned the complete re-establishment of the Papal sovereignty in its ancient territory, and the extinction of foreign domination and influence in Italy. Refusing to attend the Council of Pisa convened by the King of France, he in 1511 formed the 'Holy League,' to which Spain, England, and Switzerland were parties.

In 1512 he made open war against Louis XII. The French defeated the Papal army near Ravenna, but were soon after driven out of Italy. He is considered one of the most immoral of the Popes, but was a far-sighted and patriotic sovereign, and a liberal and judicious patron of art and literature.

Julius III (Giovanni Maria del Monte), a Roman of low birth, was made cardinal by Paul III in 1536, took an active part in the Council of Trent as Papal legate, was elected Pope in 1550, and in the following year reopened the Council of Trent, which had been suspended for upwards of two years. He endeavoured to effect a union with the Nestorians, and commissioned Cardinal Pole to organize, in conjunction with Mary, the reunion of England with Rome. He died in 1555.—BIBLIOGRAPHY: L. Pastor, *History of the Popes*; M. Creighton, *History of the Papacy*.

JULY', the seventh month in the Christian calendar, having thirty-one days. In the Roman year it bore the

name of *Quintilis*, as originally the fifth month. Its change of name to *Julius* was in honour of Julius Cæsar, who was born on the 12th of the month. It was called *Hegmonath* and *Maedmonath* by the Anglo-Saxons.

JUMILLA (*hö-mēl'yá*), a town of Murcia, Spain, and the terminus of the Alicante-Valencia-Jumilla Railway. It has exports of esparto, cloth, wines, and oil. Pop. 20,500.

JUM'NA, a river of India, which rises in the Himalayas, in the native state of Garhwal, near Jumnotri, at the height of 10,849 feet. It flows in its upper course in a generally south-west direction, then bends to the south-eastward, and, passing the cities of Delhi and Agra, falls into the Ganges at Prayāga, 'the place of sacrifice,' now known as Allahabad, after a course of 860 miles. Some trade is carried on by means of clumsy barques.

Two important irrigation works—the Jumna Eastern and the Jumna Western Canals—derive their supply of water from this river. The former is 160 miles long, and irrigates about 250,000 acres annually; the latter has a length of 433 miles, and irrigates on an average about 360,000 acres.

JUMPING-HARE (*Pedētes caffer*), a leaping rodent found in South Africa, and so named from its general resemblance to a hare, and its jumping mode of progression, necessitated by the elongated nature of the hind legs. It is the type of a special family (Pedetidæ) allied to the jerboas.

JUMPING-MOUSE (*Zapus hudsonianus*) is found in Labrador and North America generally, but is especially an inhabitant of the fur territories. It belongs to the same family as the jerboa (q.v.).

JUNA'GARH, native state of Gujerat, Bombay Presidency, India; area, 3,336 sq. miles. The surface is generally level, but rises on the Girnar Hills to 3,666 feet. Irrigation is extensively required for agricultural purposes. The nawab or ruler pays tribute both to the British Government and to the Gaekwar of Baroda. Pop. 465,493.

The capital, **Junagarh,** situated under the Girnar and Datar Hills, is one of the most picturesque cities in India, and contains some old Buddhist caves. Pop. 33,221.

JUN'CEÆ, or **JUNCA'CEÆ,** the rush order, a small natural order of monocotyledons, so named from the typical genus Juncus. It is principally composed of obscure herbaceous plants with brown or green glumaceous hexandrous flowers, the perianth being in two series, as in Liliaceæ, but calycine instead of petaloid. Some of them, as the common rush, are employed for making mats, chair-bottoms and brooms.

JUNE (Lat. *Junius*), the sixth month in the Christian calendar. It consisted originally of twenty-six days, to which it is said Romulus added four, and from which Numa took away one. Julius Cæsar again lengthened it to thirty days, and it has ever since remained unaltered. June was called *Sere-monath* (dry month) by the Anglo-Saxons.

JUNEAU, the capital of Alaska since 1906, on the Gastineau Channel, and on the route to Klondike; the centre of a considerable trade in an important mining and fishing district. It was founded about 1880. Pop. (1930), 4,043.

JUNG, Carl Gustav, Swiss scientist, born in 1875, associated with Freud (q.v.) in the theory and early development of the system for the analysis of mental processes known as psychoanalysis. A difference of opinion ended in an open rupture, and Jung subsequently returned to Zürich, where he founded a school of psychotherapy. His works include *Studies in Word Association* (1918); *Psychological Types* (1923); *Contributions to Analytical Psychology* (1928); *The Secret of the Golden Flower* (with Richard Wilhelm) (1930).

JUNGERMANNIACEÆ, or **JUNGERMANNIALES,** a large family of Liverworts. Most of them have distinct leaves. They inhabit the trunks of trees or damp earth, in cool moist climates.

JUNGFRAU (*yungfrou*; 'Maiden'), a snow-clad mountain peak of Switzerland, in the Bernese Oberland, on the frontier of the cantons of Bern and Valais. It is one of the most magnificent of the Swiss mountains (height, 13,670 feet), and was first ascended in 1811. The ascent may now be made by railway and lift.

JUNGLE (*jung'gl*; Hind. *jangal*, waste land, desert), properly an Indian term applied to a desert and uncultivated region whether covered with wood and dense vegetation or not, but in English it is applied to land covered with forest trees, thick impenetrable brushwood, or any coarse rank vegetation.

JUNGLE-FEVER. *See* TROPICAL DISEASES.

JUNGLE-FOWL, a name given to four species of Asiatic birds of the same genus as the domestic fowl, which is believed to be derived from one or other of them. Most probably the honour belongs to the red jungle-fowl (*Gallus ferrugineus*), which re-

sembles the game breeds on a small scale, and ranges from North-East and Central India to the East Indies and Philippines.

The grey jungle-fowl (*G. sonnerati*) is native to Southern, Central, and Western India; Lafayette's jungle-fowl (*G. lafayettii*), with a yellow comb edged with red, is indigenous to Ceylon; and *G. varius* inhabits Java, Lombok, and Flores.

JUNIN (hö-nēn'), a department of Peru, embracing the wildest parts of the Cordilleras. The capital is Huansayo. Area, 22,814 sq. miles; pop. 450,000.

JU'NIPER, the name of hardy exogenous evergreen trees and shrubs of the genus Juniperus, chiefly natives of the northern parts of the world. They belong to the nat. ord. Coniferæ, group Gymnospermeæ.

About twenty species are known, the most important of which are the *J. communis*, *J. sabina*, or savin, *J. virginiana*, and *J. bermudiana*. *J. communis*, or common juniper, is a common bush growing wild in all the northern parts of Europe, and abundant on the mountains of Wales, Scotland, and Ireland, and on low ground in the northern parts. The berries require two years to come to maturity, when they assume a bluish-black colour. They are used extensively in Holland in the preparation of gin, which owes its characteristic flavour to them. They yield an essential oil, which is a powerful diuretic. *J. sabina* or savin, also yields a powerful diuretic, and an oil which is a local irritant.

J. virginiana and *J. bermudiana* are trees. The former is the common red cedar of North America; the latter is known as Bermuda cedar. Both yield a wood used in cabinet-making and in the manufacture of pencils.

JU'NIUS, a signature attached to a famous series of seventy letters on public affairs which first appeared in *The Public Advertiser*, a London paper published by Woodfall, from which they were copied into most of the other journals of the time. The earliest is dated 21st Jan., 1769; the last, 21st Jan., 1772. After they were completed they were collected and published by H. S. Woodfall, with a dedication to the English nation and a preface by the author.

Other letters bearing the same characteristics, but having different signatures, appeared between 28th April, 1767, and 12th May, 1772, and are given in the younger Woodfall's edition as the *Miscellaneous Letters*. This edition was published in 1812 in three vols., and included Junius's private letters to Mr. H. S. Woodfall, and a preliminary essay by Dr. J. Mason Good.

An enlarged and improved edition was published in Bohn's *Standard Library*, edited by John Wade, with an essay by the editor in favour of the claims of Sir Philip Francis to the authorship. Although such an interval has elapsed since the publication of these papers, their authorship seems as far from being settled as ever.

In seeking for a probable author of these letters the chief difficulty has been to find anyone who combined the knowledge, circumstances, distinctive opinions, and literary skill displayed by Junius. He supported the court party against America, favoured triennial Parliaments, and opposed the abolition of rotten boroughs. He was evidently well acquainted with court and city politics, the management of public offices, the private intrigues of the time, and if not a lawyer he had considerable knowledge of law.

Besides this, he seems to have been a man of rank and fortune, for we find him writing to Woodfall: "I am far above all pecuniary views;" and he expressly asserted that "My rank and fortune place me above a common bribe." With these characteristics and this wide information he united a boldness, venemence, and rancour which, combined with his epigrammatic and unsparing invective, rendered him an object of terror to those whom he attacked.

Public suspicion at the time was fixed most strongly on Burke and Viscount Sackville. But Burke denied the authorship spontaneously to Dr. Johnson, and apart from considerations drawn from his temper, style, and turn of thinking, on several points Burke and Junius were in direct opposition to each other.

That Viscount Sackville was the author received considerable belief at the time. His rank, fortune, temper, and talents concur to make it probable, while the friends and enemies of Sackville and Junius coincide. Yet the proof is far from complete in favour of this hypothesis. An attempt was also made to show that Lord Temple was the author, on the ground that the political and personal connections of Junius and Lord Temple were the same, and that his talents, age, circumstances, and style of writing and thinking rendered the hypothesis probable. The opinion that Sir Philip Francis (died 1818) was Junius has been probably the most common. *See* FRANCIS, SIR PHILIP. The best edition of the letters is that already mentioned, by J. Wade.—BIBLIOGRAPHY: H. R. Francis,

Junius Revealed; J. Smith, *Junius Unveiled*.

JUNIUS Franciscus, Dutch scholar, born 1589, lived for about thirty years in England, then in Holland, and died at Windsor in 1677. Of Old-English and the ancient Germanic literatures he had an extensive knowledge; he published a glossary of Gothic (*Glossarium Gothicum*, 1664–5), and a work on English etymology (*Etymologicum Anglicanum*), and left a valuable collection of MSS. He also wrote a work entitled *De Pictura Veterum* (1637), and published the first edition of the Gothic Gospels of Ulfilas (1665).

JUNK (Mal. *ajong, jong*, ship), a flat-bottomed ship, very seaworthy but clumsy, used by Chinese and Japanese. It has a high forecastle and poop, and ordinarily three masts of considerable height, each mast being in one piece, with a lug-sail, generally of bamboo splits. The bow is bluff, the stern full, and there is a very large rudder. The term *junk* is applied by sailors to obsolete gear and to certain kinds of stored and salted meat.

JUNO, the principal Roman goddess, sister and wife of Jupiter; the equivalent of the Greek Hera. She was the queen of heaven, and under the name of Regina (queen) was worshipped in Italy at an early period. She bore the same relation to women that Jupiter did to men.

She was regarded as the special protectress of whatever was connected with marriage, and women from birth to death had her as a tutelary genius. She was also the guardian of the national finances, and a temple, which contained the mint, was erected to her under the name of Juno Monēta on the Capitoline. *See* HERA.—BIBLIOGRAPHY: L. R. Farnell, *Cults of the Greek States*; Sir J. G. Frazer, *The Golden Bough*.

JUNOT (zhŭ-nō), **Andoche, Duc d'Abrantès,** Marshal of France, was born in 1771, and died 1813. He was intended for the Bar, but on the outbreak of the Revolution joined a volunteer battalion, and at the siege of Toulon, in 1793, he became secretary to Napoleon, whom he accompanied into Italy in 1796 and Egypt in 1798 as aide-de-camp. In Egypt he was advanced to the rank of general of brigade.

In 1800 he was made Commandant of Paris, and he particularly distinguished himself at the battle of Austerlitz in 1805. In 1807 he was sent with an army into Portugal, and made his entry without opposition into Lisbon, his success being rewarded with the title of Duc d' Abrantès. Defeated by the British at Vimiera, he was obliged to submit to the humiliating Convention of Cintra, and to evacuate the occupied territory.

Although he subsequently took part in the campaigns against Austria (1809), against Spain (1810), and against Russia (1812), he failed to retrieve his reputation, and fell into disfavour with Napoleon. In 1813 he became insane, and committed suicide by leaping from a window. The Duchesse d' Abrantès wrote voluminous *Mémoires*.

JUNTA (Spanish, an assembly), in Spain, a high Council of State. It was originally applied to an irregularly summoned Assembly of the States, as distinguished from the Cortes or Parliament regularly called together by the authority of the king.

JUPATI PALM (jų-pâ-tē'; *Raphia tædigĕra*), a palm which grows on the rich alluvial tide-washed soil on the banks of the Lower Amazon and Pará Rivers in Brazil. The trunk is only 6 or 8 feet high and 1 foot in diameter. The leaves rise nearly vertically from the trunk, bending out on every side in graceful curves, forming a magnificent plume 70 feet in height and 40 feet in diameter. Leaves have been measured 48 and 50 feet long, and even these are not the largest. The leaf-stalks, which measure from 12 to 15 feet in length, are used for a variety of purposes, as for the walls of houses, baskets and boxes. An African species (*R. Raffia*) yields fibrous filaments (*raphia* fibre), imported into Europe for tying plants, &c. *See* RAPHIA.

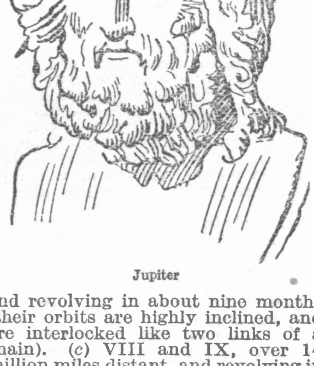
JU'PITER, or JUPPITER, the supreme deity of the Latin races in ancient Italy, the same as the Greek *Zeus*, and the Sanskrit *dyaus* (which means the sky); the second part being the same as the Latin *pater*, father. As the supreme deity Jupiter received from the Romans the title of *optimus maximus* (best greatest), and as the deity presiding over the sky he was considered as the originator of all the changes that took place in the sky. From him accordingly proceeded rain, hail, and the thunderbolt, and he it was that restored serenity to the sky after it had been obscured by clouds. Hence the epithets of Pluvius (rainy), Tonans (thundering), &c., were applied to him.

The most celebrated of his temples was that on the Capitoline Hill dedicated to him as Jupiter Optimus Maximus, jointly with Juno and Minerva. He was represented with a sceptre as symbolical of his supreme authority. He maintained the sanctity of oaths; he was the guardian of all property; and every Roman was believed to be under his protection, and that of his consort Juno, the queen of heaven.

White animals were offered up to him in sacrifice, his priests wore white caps, and his chariot was represented as drawn by four white horses.—BIBLIOGRAPHY: L. R. Farnell, *Culis of the Greek States*; A. W. Cook, *Zeus, God of the Bright Sky*.

JUPITER is the largest planet of the solar system and the fifth (excluding the asteroids) in order of distance, revolving at a mean distance from the sun of 483 millions of miles, in a period of 11·86 years. Its equatorial diameter is about 88,700 miles, and polar diameter about 82,800 miles. Its volume is over 1,300 times the earth's, but, being much less dense, it possesses only 318 times the earth's mass. The planet's equator is inclined only about 3° to the plane of its orbit.

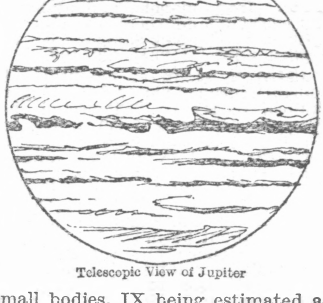
Jupiter's retinue of satellites consists of (*a*) four principal satellites (I to IV in order outwards) and the tiny innermost satellite (V), all revolving practically in the equatorial plane (V revolves in about twelve hours; IV, which is over a million miles distant, in sixteen and two-third days); (*b*) VI and VII, about 7 million miles distant,



Jupiter

and revolving in about nine months (their orbits are highly inclined, and are interlocked like two links of a chain). (*c*) VIII and IX, over 14 million miles distant, and revolving in about two years (their orbits also interlock, and in contrast to the other seven they travel in the retrograde direction.)

The four principal satellites, which were discovered in 1610 by Galileo, present interesting phenomena of eclipses, transits, &c.; III, and probably also IV, is slightly larger than Mercury. The other five, discovered between 1892 and 1914, are all very



Telescopic View of Jupiter

small bodies, IX being estimated as some 15 miles in diameter.

Jupiter's surface is divided into a number of zones, by belts parallel to its equator. These are more or less permanent characteristics, but show slight variations of form, colour, and intensity. Spots and markings appear and disappear from time to time. The Great Red Spot, lying against a bay or hollow on the southern edge of the south equatorial belt, has been a remarkably persistent feature, existing for nearly fifty years, or possibly much longer.

The South Tropical Disturbance, in the south tropical zone, has been seen since 1901, and stretches about halfway round the planet. These markings became nearly obliterated in 1919, apparently through overlying vapours, as they subsequently recovered their prominence.

The equatorial zone, between the north and south equatorial belts, rotates in about nine hours fifty minutes. Beyond these belts the period is five to six minutes longer (*see* SUN). It is evident that we do not see any solid globe of Jupiter, but only the upper surface of a turbulent envelope of cloud. The planet must be in a state of intense heat, and though no longer self-luminous, still in a partially sun-like condition.

JU'RA, an island of Argyllshire, Scotland, one of the Inner Hebrides, separated from Islay by a strait 1½ miles wide, having the whirlpool of Corryvrecken between it and the Island of Scarba. Its general aspect is exceedingly wild and rugged, and it is chiefly devoted to the rearing of

cattle and to deer forests. The area is 143 sq. miles. Pop. (1931), 382.

JURA (zhü-rà), a department in the east of France, bordering on Switzerland; area, 1,951 sq. miles. A large part is covered by the Jura Mountains, and it is drained by the Ain and the Oignon. It is a great dairying district, and Gruyère cheese is extensively made. Iron, marble, and alabaster are worked, and there are also salt springs. Lons-le-Saunier is the capital. Pop. (1931), 229,109.

JURA, a chain of mountains in Central Europe, partly belonging to France, partly to Switzerland, between which they form a natural barrier, extending from south-west to north-east, and exhibiting a number of parallel ridges. The greatest length is some 200 miles, from Belley in France, department of Ain, to the banks of the Rhine; and the greatest breadth about 63 miles, between the Lake of Geneva and the banks of the Doubs. The principal geological formation is the Jura limestone, with green sand, belonging to the Lower Cretaceous series. Stalactite caves are numerous.

The two chief rivers which have their source in the chain are both French—the Ain and the Doubs—and, descending from its western slopes, belong to the basin of the Rhône. Its highest points are Crêt de la Neige, Reculet (or Reculet de Thoiry), Mont Tendre, and la Dôle, the heights of which are respectively 5,653, 5,643, 5,521, and 5,511 feet.

JURASSIC SYSTEM, a system of strata in the Mesozoic group, between the Triassic and the Cretaceous, formerly divided in Britain into two sections, the Liassic below and the Oolitic above. The term Lias has become adopted in various countries as a synonym for the lowest of the three series now classed together as Jurassic, from their development in the Jura Mountains. In Germany these series, in upward sequence, are styled the Black, Brown, and White Jura.

The Jurassic strata are well developed in England from the coast of Dorset to the Cleveland Hills of Yorkshire, forming the low ground east of the Severn, the bold escarpment of the Cotswold Hills, the promontory of Portland, and the picturesque country around Oxford. They are concealed by Cretaceous beds on the east, but emerge again in the Côte-d'Or area above Dijon and in the folded masses of the Juras.

The lithological variety of the strata, formed in a warm sea of no great depth, and their richness in fossil remains, have led to important series of memoirs in most European languages, while the terrestrial Jurassic beds of the Central United States have furnished Marsh, Cope, and their successors with a magnificent sequence of vertebrate remains.

The occurrence of a delicately stratified limestone, the lithographic stone of Solnhofen and Eichstätt in Northern Bavaria, in the Upper Jurassic series has made known, in the form of casts, the soft parts of several extinct organisms, including the wings of flying reptiles and the feathers of the earliest known bird.

The fauna of Jurassic times shows a comparatively rapid development of that of the Triassic beds of the Alpine region. The brachiopods, so varied in Palæozoic times, are practically restricted to the modern types Terebratula and Rhynchonella; but the mollusca are very varied, culminating in a wealth of ammonites, which have been used as zone-fossils in tracing the sub divisions of the beds. The fish still retained cartilaginous skeletons, and were mainly protected by their bony scales; the labyrinthodont amphibians of the Permian and Trias had, however, passed away.

The earth was now given over to the reptiles, which spread their dominion over the land, the ocean, and the air. The dinosaurs, which often assumed a bipedal gait, attained enormous sizes, 100 feet and more in length, in the American and Central African regions. Giant forms are traced in the shore-deposits of Jurassic times in England. Allied to these, the small Compsognathus, with bird-like features in its bone-structure, is found in the lithographic stone of Germany side by side with Archæopteryx, which links the reptiles with the feathered race of birds.

The mammals remained of humble type, monotremes and marsupials, if we may judge from remains that mostly consist of lower jaws and teeth. The flora included numerous conifers and cycads, but was essentially cryptogamic or gymnospermous. The Jurassic period, viewed as a whole, has been justly called the age of reptiles.

The beds in England have provided so fertile a field for stratigraphers and palæontologists that it may be convenient to cite their broad divisions in the table on page following.

Beds of Lower and Middle Jurassic age in England contain valuable stratified ores of iron, mainly formed by the substitution of iron carbonate for limestone. The oolitic limestones of Bath and Portland are valuable building-stones.

JURAT, in English law, that portion of an affidavit which narrates when, where, by whom, and in whose

presence the oath was taken. Also, the title of the members of the Royal Court of Justice of Jersey and Guernsey.

Upper Jurassic.	Purbeck Beds (passage-beds to Wealden). Portlandian. Kimmeridge Clay. Oxfordian (Coral Rag and the underlying Oxford Clay).
Middle Jurassic.	Bathonian. Inferior Oolite. Midford Sands (link with Lias).
Lower Jurassic.	Upper Lias. Middle Lias. Lower Lias.

JURISPRUDENCE. *Juris prudentia* among the Romans originally signified knowledge of the law as possessed by a practising lawyer at Rome. Later it took a much wider meaning, and came to be conceived of as a branch of philosophy. Thus Ulpian in a well-known passage defines jurisprudence as "the knowledge of things human and divine, the science of the just and unjust."

The Romans had thus risen to the conception of jurisprudence as a science of legal principles not confined to one, but underlying the laws of all countries and constituting a law of nature. This furnished an ideal standard or criterion by which the validity of actual laws could be determined and their defects remedied.

Similarly in modern popular phraseology we sometimes find 'jurisprudence' pompously used in its original practical sense, as when we speak of the 'jurisprudence of France,' when the simpler word 'law' would serve. But the term jurisprudence is more properly restricted to the philosophic and scientific investigation of legal systems, the science of philosophy concerned with an examination of the principles which underlie the legal relationships of mankind and the legal rights and duties to which those relationships give rise.

The study of the science might be confined to the legal system of one country, but as it is desirable that the data should be as wide as possible, it has usually been undertaken from the point of view of comparative law. The legal systems of various countries are examined in detail, and after a process of selection, comparison, and classification we arrive inductively at certain universal principles underlying the concrete laws so examined.

This unity, established by the method of 'comparative jurisprudence,' arises from the common nature of man and the essential identity of the structure of human society in every State despite accidental, and, therefore, for the purpose in hand, negligible variations. This identity, recurring in all ages and in all countries, results in a permanence and identity in the legal ideas and method which determine the relations of man to man in their outward acts.

Law prescribes rules consonant with the nature of man as a being in whom reason is the predominant element. The sphere of law is narrower than that of morality. Whereas morality deals with the whole of conduct, including thought, feeling, and intention, law is concerned only with those parts of conduct affecting the community. The line of distinction between law and morality is differently drawn in different communities, depending on their stage of development.

The rules which regulate these relations come into being in two main modes. (1) Even before the organization of the community into a State, a series of customs arises regulating the most common relations of life, and spontaneously observed by all classes of the population. Such customary rules, based at first on reason and common sense, come to be followed with unquestioning obedience. (2) After the organization of the State, rules are consciously imposed by the supreme political authority. Thus in every system of national law we have two classes of rules: one, originating at first direct from the people, and later enforced not by public opinion but by the political authority; the other consisting of enactments laid down by the political sovereign.

Differing in origin, both of these sets of rules draw their validity from the express or tacit acquiescence of the State. The topics of these rules or laws which thus come under regulation by the State are family relations, the security of property, the safe-guarding of individual liberty, the enforcement of contracts, and the prevention of crimes.

The object of these rules is the creation and protection of legal rights, or, expressed otherwise, the creation and enforcement of legal duties: duty and right being correlative. Law is a necessary product of the complexity of life in a State. Regarded at first by the individual as a restraint, law comes to be recognized as the foundation and source of freedom in imposing general rules to which all must conform. It realizes freedom in formulating rules in accordance with which each can live, without encroaching on the freedom of others.

The subject-matter of law consists of legal rights. Before such rights can be classified according to some intelligible principle, it is necessary to have a knowledge of some elementary conception involved in every right. These elements are persons, things, and acts—the persons clothed with rights, the persons against whom rights are available, the things or objects over which rights are claimed, the acts of which the person who has the right is entitled to exact performance.

A person is one possessed of a status or capacity for legal rights or duties, and may be either a natural individual human being, or a juristic person like a corporation composed of individuals and treated for the purposes of law as being a unity and as possessing some of the attributes of human beings. Thing is the object of a right, and may be either a material thing or an incorporeal thing (e.g. a patent) which the law regards as if it were a material object and capable of transfer. An act in the legal sense is a determination of will producing an effect externally.

A consideration of each of these elements leads to a great variety of subtle distinctions which have to be carefully weighed by courts of law. Thus under the conception of person we may have to consider the effect of minority, sex, or sanity on legal capacity. Again, things, though physically divisible, may be regarded by law as indivisible. Under act, which involves will and consciousness, arise problems connected with force and fear and fraud, ignorance and negligence.

In their efforts to produce a science of philosophy of law, in which all the departments of law would be clearly marked off and defined, and its topics symmetrically and logically arranged, jurists have sought for a criterion or principle of division which might be regarded as decisive. Accordingly some have divided the whole province of law into the law of persons and the law of things. Continental jurists, on the other hand, followed in this country by Professor Holland, have adopted the classification of Roman jurists into public law and private law as crucial.

The criterion or principle of division here is whether or not the State is directly concerned as a party. The State, for its own preservation and for the adequate accomplishment of the purposes for which it exists, is conceived of as having rights which it may enforce and which when infringed it may punish.

Under public law are embraced (1) constitutional law, which defines the form of government, the depositaries of the legislative, executive, and judicial functions, and determines the limits of administrative authority. (2) Administrative law, which regulates the machinery by which the State conserves its own existence and provides for the material and moral welfare of the people. (3) Criminal law, which contains a classification of criminal acts and their penal consequence.

The basis of the law of crime is the conception which slowly evolves that by some acts the State as a corporate whole is more directly injured and menaced than by others. In primitive societies even violent wrongs were regarded as concerning exclusively the person injured, who was left to exact for himself reparation for wrongs.

The second great division is private law, where both parties are private persons and the State is not involved except as an arbiter. Under this division is embraced (*a*) the relations of family life, the rights and duties of husband and wife to each other and their children, the modes of constituting and dissolving the marriage tie; (*b*) the forms and conditions of ownership of land and other classes of property, the extent and nature of rights of property, and the modes of vindicating such rights when infringed; and (*c*) the binding force of contract.

These topics form a conspicuous portion of the law of every advanced community, and suggest a natural method of classification into distinct categories of law. These categories, provided by the scientific methods of jurisprudence, are, of course, not readily intelligible unless illustrated by reference to a concrete system of law.

The great writers on jurisprudence have adopted different methods of dealing with the material of the science, giving rise to three schools: the Analytic, the Historical, and the Philosophic or Rational, of which the chief exponents are Holland (jurisprudence), Maine (ancient law), and Kant (philosophy of law). BIBLIOGRAPHY: J. Austin, *Lectures on Jurisprudence*; B. N. Cardozo, *Paradoxes of Legal Sciences*; Mainly *Ancient Law*.

JURY AND JURY TRIALS. The origin of trial by jury is not traceable to any single legislator or any particular period. It seems to have had its beginning in certain primitive customs of the northern European races, and received special developments from different nations. By the Anglo-Saxons a person who was accused of crime was permitted to summon twelve of his neighbours, called compurgators, who swore to

his innocence. This was the origin of an institution which took settled and vigorous form after the Norman Conquest, gradually developing into its present form.

Grand Jury. In criminal trials two juries act, the *grand jury* and the *petty jury*. The *grand jury* may consist of any number more than eleven and less than twenty-four men, who have been summoned by a mandate from the sheriff of the county. Their names are returned on a piece of parchment which is called a *panel*. The oath having been administered, they are usually instructed by the presiding judge in the nature and number of the offences about to be brought before them.

They then proceed to consider in private the statement or *indictment* which is brought against the accused by the prosecution. Should they agree, to the number of twelve, that the accusation has a basis of truth, they bring into court what is called 'a true bill.' If, on the contrary, they find that there is no sufficient foundation for the accusation, they *ignore* the bill, and require the dismissal of the accused.

When a true bill is found by the grand jury, it usually forms the basis of the subsequent prosecution. The grand juryman is qualified by being a freeholder of his county, to what amount is not clearly defined.

Petty Jury. *Petty* or *petit juries* consist of twelve persons and no more, for the trial of all criminal offences and of issues of fact in civil cases at the common law. To serve on a jury any man or woman is qualified who, being above the age of 21 and under 60, (1) is in the city of London a householder or occupier of a shop with real or personal estate of £100; (2) (*a*) in counties, residents beneficially possessed of £10 per annum in real estate or rent charge, or £20 in leaseholds held for not less than 21 years or life; (*b*) householders assessed to the poor rate at not less than £30 per annum in Middlesex or the county of London, or £20 in other counties; (*c*) occupiers of houses with not less than fifteen windows; (3) in boroughs, the burgesses.

In any panel the number of women is to bear to the number of men as nearly as possible the same proportion as appears on the list from which the panel is chosen. If a special jury is demanded, higher property qualifications are required in those fitted to act as jurors. In the case of persons summoned to serve on any of the inferior courts, the fine in case of default is not to be more than 40 shillings or less than 20 shillings.

In high courts, assizes, &c., fines are at the discretion of court. The jury is selected by ballot from those summoned. If all the jurors do not appear, or any of them are justly objected to and set aside, in virtue of the right of challenge exercised by the parties to a suit (*see* CHALLENGE), the deficiency may be supplied from among the by-standers having suitable qualifications.

The jury being then sworn is placed in the jury-box, and the evidence given. No juror is at liberty to leave the box without permission of the court. Unless the case be one of murder, treason, or treason felony, the jury may be allowed to go home at any stage prior to the judge's summing-up, on engaging not to allow themselves to be spoken to on any subject connected with the trial.

When the prisoner is charged with murder, treason, or treason felony, the jury are usually allowed to retire only in custody of the sheriff and his officers, who are sworn to keep them together, and not to speak to them with reference to the trial. When the evidence has been given, it is usual for the presiding judge to instruct the jury in the points of law which apply to it. It is thus that their duties are divided—the jury dealing with the facts, and the judge with the law of the case.

The jury must form an independent judgment upon the facts, and their finding is considered final. To consider their verdict they usually withdraw to a private room, where no intercourse with other persons is permitted, and where, when the session is protracted, food and other necessaries are supplied.

Upon returning into court the foreman of the jury states the verdict at which the jury have arrived. If they fail to agree among themselves, the jurymen are discharged by the judge, and the cause can be tried anew. In civil cases a majority verdict may be given, if the parties agree to this.

Coroner's Jury. Another kind of jury is the *coroner's jury*, summoned to inquire into cases of sudden or violent death. The inquiry is made after the coroner has viewed the body (before its burial if the coroner so directs, or if a majority of the jury desire it, the jury may view the body also) at the place where the death happened. The jury may consist of any number, not less than seven or more than eleven.

In the case of violent death the jury may return a verdict of manslaughter or murder as the case may be, and the person or persons against whom the verdict is returned, if known, are committed for trial. A coroner must also summon a jury to ascertain the

ownership of treasure trove and in other cases if he thinks there is any reason for a jury.

In Scotland there is no coroner's jury, and the only case in which a grand jury is summoned is that of treason. In all other criminal trials in Scotland the jury consists of fifteen jurors, and a majority is sufficient to convict. In civil cases the number of jurors is, as in England, twelve; the verdict may be by a majority, but only after three hours' deliberation. As in England, jurors are either special or common.

The qualification of a common juryman is that he be between the ages of twenty-one and sixty, and owns in fee or life rent heritage of the annual value of £5, or has moveable property valued at £200. Any juror who fails to appear without sufficient excuse given is liable to be fined in a sum not exceeding £5, and not less than £2. Besides the verdicts of 'guilty' or 'not guilty,' it is permitted to the jury in Scotland to return a verdict of 'not proven.' This releases the person, but stains the character of the accused.

JUS GENTIUM, those principles which the Romans found to prevail in common among the Italian tribes. Later applied to the law presumed to be common to all men before the creation of States. It is to be distinguished from International Law, which regulates the relations of States *inter se*.

JUS MARITI, in Scots law, the right of ownership which a husband formerly possessed over his wife's moveable estate, whether possessed by her at the date of the marriage or acquired thereafter, unless the right was excluded by antenuptial contract or by the party from whom the estate was derived. Legally, it was his own absolute property. From 1861 onwards the right was gradually curtailed, and in 1881 it was abolished as regards marriages contracted and property acquired thereafter.

The husband's right of administration (*jus administrationis*), whereby his consent was necessary to the disposal of the corpus of her estate both heritable and moveable, was, however, retained, and did not wholly disappear until Dec., 1920. The *jus mariti* never extended to the wife's paraphernalia (i.e. her jewellery and clothing).

JUS RELICTÆ (Scots law), the right of a widow to a share of her deceased husband's moveable estate, namely, to one-third if he is survived by children, and otherwise to one-half. The right cannot be defeated by will, but may be excluded by antenuptial contract or satisfied by a testamentary provision accepted in lieu thereof. The corresponding right of a husband in his wife's estate is known as *jus relicti*. *See* LEGITIM.

JUSSERAND (zhŭs-răn), **Jean Adrien Antoine Jules**, French writer and diplomatist, born in 1855, died 1932. From 1887 to 1890 he was attached to the French Embassy in London, and in 1898 he was minister at Copenhagen. From 1902 to 1925 he was Ambassador to the United States. He wrote several books, mainly connected with English history and literature, among them being *Les Anglais au moyen âge*; *La Vie nomade et les routes d'Angleterre au XIVe siècle* (English translation, Wayfaring Life in the Middle Ages); *Le Roman au temps de Shakespeare* (1888—translation, The English Novel in the Time of Shakespeare); *Histoire littéraire du peuple anglais* (1894–1904—translation, Literary History of the English People); *Shakespeare en France* (1898); *Ronsard* (1913); and *With Americans of Past and Present Days* (1916).

JUSSIEU (zhŭs-yœ), a French family belonging to Lyons, which has produced a number of distinguished botanists, of whom the following are the principal.—**Antoine de**, born 1686, died 1758.—**Bernard de**, brother of the above, born 1699, died 1777.

Antoine Laurent de, nephew of the above, born in 1748, died 1836. His work entitled *Genera Plantarum* formed the first complete exposition of the natural system of classifying plants, which has now taken the place of the artificial Linnæan system. His other chief work was *Principes de la méthode naturelle des végétaux*.

Adrieh de, son of the preceding, born in 1797, died 1853. By his researches and publications he placed himself in the front rank of botanists. His best-known work was *Traité élémentaire de botanique*, for use in higher-class schools, which far excelled all previous works of the kind.

JUSSIEUA, a genus of tropical aquatic or marsh-herbs, ord. Onagraceæ. Some species have special floating roots of spongy texture; these are very rich in intercellular spaces, and act as 'gills' for the ventilation of the parts embedded in the mud.

JUSTICE, a common term for a judge or legal official appointed to hold courts and administer justice, especially given to judges of superior courts. Thus in England the judges in the common law and chancery divisions of the High Court of Justice as so called, the head of the common law division being the Lord Chief Justice of England. The term is

similarly used in the British colonies and the United States. *See* LAW, COURTS OF; CHIEF JUSTICE; and articles below.

JUSTICE, LORD CHIEF. *See* CHIEF JUSTICE.

JUSTICE-CLERK, LORD, in Scotland, the vice-president of the Court of Justiciary, and the presiding judge of that court in absence of the Lord Justice- General (*see* next article). He is one of the Officers of State for Scotland, and one of the Commissioners for keeping the Scottish regalia. He is always one of the Senators of the College of Justice, and president of the second division of the Court of Session.

JUSTICE-GENERAL, LORD, in Scotland, the presiding judge of the High Court of Justiciary, the supreme criminal court. The office is held along with that of Lord President of the Court of Session, the supreme civil court. *See* SESSION, COURT OF.

JUSTICE OF THE PEACE, a judicial magistrate entrusted with the conservation of the peace. In Britain the first judicial proceedings are held before him in regard to arresting persons accused of grave offences; and his jurisdiction extends to trial and adjudication for small offences. In case of the commission of a crime or a breach of the peace a complaint is made to one of these magistrates. If he is satisfied with the evidence of a commission of some offence, he issues a warrant directed to a constable, tries the party if the offence be within his jurisdiction, and acquits him or awards punishment.

The justices meet in petty sessions or in quarter sessions, where they try offences of a minor sort, and they have certain other duties to perform, such as the licensing of places for the sale of intoxicating liquors—all duties being performed gratuitously. Justices are appointed by the Crown (through the Lord Chancellor, commonly on the recommendation of a Lord-Lieutenant or town council).

In counties (till 1906) a person to be eligible must possess an estate of £100 per annum, or occupy a dwelling-house rated at £100. No such property qualification is now necessary. Borough justices must reside in or within miles of the borough or occupy property in it. A mayor (or provost) is ex officio a justice. In Scotland the duties of a justice of the peace are more limited than in England, at least in practice. A property qualification is not necessary. In Canada and other colonies there are also justices of the peace, holding their commissions from the Crown.

Since 1919, by the Sex Disqualification Removal Act, women, equally with men, are eligible for appointment as justices of the peace. In the United States the office is held by special appointment, usually for three or four years. The position is similar to that of the justices in Britain.—Cf. Pollock and Maitland, *History of English Law.*

JUSTICES, LORDS, in Great Britain, persons formerly appointed by the sovereign to act for a time as his substitute in the supreme government, either of the whole kingdom or of a part of it. Thus when George I went abroad in May, 1719, he entrusted the government during his absence to thirteen Lords Justices; and nineteen Lords Justices and guardians were also appointed when George IV went to Hanover in 1821.

The title **Lords Justices of Appeal** is in England given to a certain number of judges belonging to the appeal division of the Supreme Court of Judicature.

JUSTICES IN EYRE, or **ITINERANT JUSTICES,** in England, justices who travel about over fixed circuits dispensing justice, the judges of assize in fact. Such itinerant judges were first appointed in 1176; in Magna Charta they were required to visit each county annually. *See* ASSIZES, CIRCUIT.

JUSTICIARY COURT, the supreme criminal court in Scotland, consisting of the Lord Justice-General (who is the president), the Lord Justice-Clerk, and other judges of the Court of Session. Besides sitting in Edinburgh, the judges go on circuit. Cases are tried by jury, presided over usually by one judge. An appeal lies against conviction on any question of law or, with leave, on any question of fact or other sufficient ground, or, with leave, against sentence.

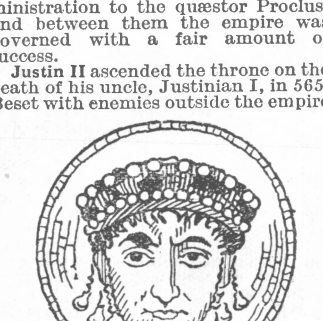
JUSTIFICATION, a theological term employed to designate the act by which a person is accounted just or righteous in the sight of God, or placed in a state of salvation. This conception of God as a judge who absolves the sinner on account of Christ's merit and imputed righteousness is based upon the Pauline writings, and received its most pronounced expression at or immediately after the Reformation.

The doctrine of justification was first clearly developed by Thomas Aquinas in the Scholastic period. Whilst the Catholic doctrine teaches that God *makes* man righteous, and imparts to him something of His own holiness, the Protestants emphasized justification 'by faith,' maintaining that God does not make man righteous, but treats him as if he were righteous. —Cf. J. H. Newman, *Lectures on the Doctrine of Justification.*

JUSTIFICATION, in law, the plea that the statement complained of in an action of libel or slander is true. In criminal libel, to be a complete defence it must also be proved that the publication was for the public benefit. *See* CRIMINALITY; HOMICIDE.

JUSTIN, or **JUSTI'NUS,** the name of two emperors of the East.—**Justin I,** born A.D. 450, died 527, a peasant of Dacia, rose from the ranks to be commander of the imperial guard, and on the death of Anastasius in 518 became emperor. He relegated the civil administration to the quæstor Proclus, and between them the empire was governed with a fair amount of success.

Justin II ascended the throne on the death of his uncle, Justinian I, in 565. Beset with enemies outside the empire



Emperor Justinian, from an old mosaic

and harassed by internal discord, he in 574 solved his difficulties by abdicating in favour of Tiberius, captain of the guard. He died in 578.

JUSTIN (Marcus Junianus Justinus), a Latin historian, who probably lived at Rome in the second or third century after Christ, although some assign him a later date. He made an epitome of the general history of antiquity by Trogus Pompeius, a native of Gaul, who lived in the time of Augustus, and whose work is no longer extant. This epitome, although incorrect in detail, is valuable for its compressed reproduction of the old histories.

JUSTIN'IAN I, Flavius Petrus Sabbatius Justinianus, surnamed the *Great,* nephew of Justin I, Emperor of the East, celebrated as a lawgiver, was born of an obscure family in A.D. 483. Patronized by his uncle, who, from a Thracian peasant, had become emperor, he was made consul in 521, and, six years later, was adopted by Justin, and associated with him in the government, although he had made a somewhat scandalous marriage with an actress, named Theodora, who exercised a great influence over him. He became emperor in 527, and died in 565.

During his reign the party disputes of the *Greens* and the *Blues* became so violent that in his attempt to quell the tumults the emperor's own life was in jeopardy, and a great part of Constantinople was destroyed by fire. Aided by his generals, he was able subsequently to restore to the Roman Empire a part of its former possessions. Belisarius defeated the Persians, achieved victories in Africa, and captured Rome in 536, and retook it in 546.

Belisarius's successor, Narses, put an end to the Ostrogoth rule in Italy. Turning his attention to the laws, Justinian commissioned learned civilians to draw up a new code, and the result was the *Corpus Juris Civilis,* or *body of civil law.* He took great interest in building cities, fortifications, and churches; among the latter he rebuilt the church of St. Sophia at Constantinople.

To maintain his public munificence he oppressed the people with taxes, and suffered his servants to commit the most flagrant crimes. His reign of thirty-eight years was a great period in the empire's history, but the emperor himself, though a man of tireless energy, was too vacillating to be really great.—BIBLIOGRAPHY: E. Gibbon, *Decline and Fall of the Roman Empire*; Th. Hodgkin, *Italy and her Invaders*; W. G. Holmes, *The Age of Justinian and Theodora.*

JUSTIN MARTYR, an early Christian writer, born in Palestine about A.D. 100, suffered for his faith about 165. Born a heathen but converted to Christianity, he went to Rome, where he wrote an *Apology for Christianity,* with a supplementary or second *Apology,* a *Dialogue with Trypho the Jew,* all still extant, besides other works. He is of importance in the history of Christian dogma.—Cf. Migne, *Patrologia.*

JUTE, a textile fibre obtained from *Corchorus capsularis* and from *Corchorus olitorius,* plants belonging to the nat. ord. Tiliaceæ (lime or linden). The jute plants are natives of India, where their cultivation is carried on, especially in Bengal, on an extensive scale. The plants are annual ones, and grow to a height of 8 to 12 feet, and occasionally even higher. The fibre is embedded in the inner bark or fibrous layer of the plant, and possesses the tenacity

common to the bark of the plants of this order.

The fibre is not very fine, but is of fair lustre, and is used for the spinning of yarns from which the comparatively coarse fabrics used in bag- and sack-making are woven. Other uses are in the manufacture of coarse twine and wrapping paper.

The manufacture of jute fabrics has been conducted in India for a considerable time, but the great spurt to the spinning and weaving of jute by power machinery followed the trials which were made in Dundee from 1830 to 1832 and onwards. These trials led to great developments in Dundee, and in 1855 jute machinery was introduced into Calcutta.

The trade in and around this city has gradually increased, and the machinery there now manufactures approximately half the total crop of jute fibre, or roughly from 4,000,000 to 5,000,000 bales, the remaining 5,000,000 to 4,000,000 bales supplying the spinning and weaving machinery in the other jute manufacturing areas of Europe and America.

JUTLAND (Dan. *Jylland*), the peninsular portion of Denmark, surrounded on three sides by the sea —the Skagerrak, the Kattegat, and the North Sea; area (including Slesvig, acquired by plebiscite in 1920), 11,412 sq. miles; pop. (1930), 1,623,362.

A remarkable feature is the series of inland water-basins known as the Liimfiord, extending from the North Sea to the Kattegat, and finding their chief outlet near Aalborg. The outlet towards the North Sea is sometimes sanded up altogether. The highest point of Jutland is the Himmeljberg, 550 feet above sea-level.

A great part of the peninsula is sandy and barren; in the south and east are some low alluvial tracts rich in verdure. There are many lakes and small rivers. The climate on the whole is temperate, but variable. The inhabitants are considered to be the most genuine specimens of the old Danish stock, and have preserved both the language and the manners and customs of early times in their greatest purity. Its earlier inhabitants, the Jutes, took part in the expedition of the Saxons to England. *See* DENMARK.

JUTLAND, BATTLE OF, naval battle fought 31st May and 1st June, 1916, between the British and the German fleets. On 30th May the British fleet, hearing the Germans were coming out of their harbours, put to sea. Sir D. Beatty with a force of six battle cruisers and four battleships in support, put out from Rosyth, and Sir John Jellicoe with 28 battleships and three battle cruisers from Scapa Flow. Each was attended by destroyers, submarines and other auxiliary craft.

On the afternoon of the 31st, the British battle cruisers met the German battle cruisers, both being in advance of the main fleets. There was a sharp encounter in which two British battle cruisers, *Indefatigable* and *Queen Mary*, were destroyed. *Tiger* and *Lion* were badly damaged, as were the *Lutzow* and two other German ships. Towards 5 o'clock Beatty, hearing of the advance of the main German fleet, turned to draw the enemy on to the British fleet, which was steaming towards him. The main fleets came into touch about 6 o'clock, but the great ships were never seriously engaged and only one of them, *Marlborough*, was hit. There was fighting among the smaller ones in which the British suffered further losses. *Invincible*, a battle cruiser, was blown up and a cruiser squadron was badly damaged, *Defence* being sunk. Some of the German ships were battered, but they were, for one reason or other, much more difficult to sink. At the approach of dark the British battleships drew off and prepared to renew the attack on the following day. There were torpedo attacks during the night, but when morning came it was found that the German fleet had escaped and was within the shelter of its minefields.

The result of the battle, however, was not satisfactory from the British point of view. With a much stronger force, 149 ships against 110, including 28 dreadnought battleships against 16, the losses of the British were heavier than those of the Germans. *See* EUROPEAN WAR.

JU'VENAL (**Decimus Junius Juvenalis**), Roman satirist, was born at Aquinum about A.D. 60, and died about A.D. 140. Few details of his life are known with absolute certainty, though there are several apocryphal Lives and a large amount of conjecture. The only facts about Juvenal that are almost certain are that he was at his prime at the end of the first century A.D.; that he sometimes, at any rate, lived at Aquinum (*Sat.* iii, 319); and that he is addressed by Martial in three epigrams (vii, 24 and 91; xii, 18).

The most authentic Life tells us that Juvenal was the son or ward of a rich freedman; that he practised the art of declamation as an amateur until he was middle-aged; that his *Satires* were long unpublished; and that his lines on the actor Paris (vii, 90) offended a contemporary actor, who

procured the banishment of the poet to Egypt, under colour of a military appointment.

It is probable, from passages in the *Satires*, that Juvenal belonged to the middle-classes, that he was of independent but not superabundant means. From the finished nature of his works it is likely that he spent a long time upon the composition of them.

It is much less likely that Juvenal was ever exiled to Egypt; if this happened, it is more likely to have occurred under Domitian, before or after A.D. 93, when we know from Martial that Juvenal was at Rome.

An ancient inscription was discovered at Aquinum recording that a certain Junius Juvenalis, a commander of a Dalmatian cohort and provincial magistrate, dedicated an altar to Ceres. This has been taken by several scholars to refer to Juvenal, but, while it may well do so, it may equally well refer to some kinsman of the poet.

From Martial's epigrams we learn that there was a strong friendship between the poets, that Juvenal was eloquent, and that he wandered about Rome in the hot weather, and attended the levees of great men. It is probable, on negative evidence, that Juvenal was unmarried.

The works of Juvenal consist of sixteen satires (the last incomplete), which have been somewhat arbitrarily divided into five books: satires 1, 2, 3, 4, and 5 form the first book; 6 the second book; 7, 8, and 9 the third book; 10, 11, and 12 the fourth book, and the remainder the fifth book. The *Satires* fall naturally into two divisions, the second one beginning with satire 8.

The difference between the earlier and the later satires is almost the same as the difference between the *Satires* and the *Epistles* of Horace. The later satires are much mellower and much less denunciatory in their tone. The first satire is an introductory one, savagely denouncing the vices and follies of the age. The second satire, together with the ninth, is usually omitted from school editions, nor is the absence of these satires to be deplored on any ground save that of incompleteness.

Juvenal's attitude towards vice is that of the moralist, not, like that of Martial, that of a humorist, but he dwells upon unpleasant details and is revolting when he does so. The third satire is one of the greatest, the famous one on Rome, imitated most ably by Johnson in his *London*. Rome lives again in Juvenal's poem as vividly as in any other piece of Latin literature.

The fourth satire displays the Emperor Domitian in a contemptible as well as an odious light, and tells the story of how a Cabinet meeting was summoned to settle the fate of a monster turbot. The fifth gives a picture of the vicissitudes of poor men at the tables of the wealthy. The sixth satire, *The Legend of Bad Women*, as it has been aptly called, is Juvenal's masterpiece, in spite of several obvious drawbacks. It is an attack on all sorts and conditions of women, and helps to explain the popularity of Juvenal in monasteries in the Middle Ages. It is thus the indirect cause of manuscripts of the *Satires* being both numerous and good. The seventh deals mainly with the difficulties of literary men at Rome.

The eighth is a fine satire on the folly of boasting of a long pedigree, and is the source of the phrase "'Tis only noble to be good," culled thence by Tennyson. The tenth satire is well-known owing to Johnson's excellent adaptation of it, *The Vanity of Human Wishes*. The closing lines of this poem (containing the famous phrase "mens sana in corpore sano") are among the loftiest passages in Roman poetry. The eleventh is an invitation to dinner, preceded by some reflections on gourmands.

The twelfth is an epistle to a friend who has just escaped from a shipwreck, together with some remarks on legacy-hunters. The thirteenth is an epistle to a friend who has been defrauded of some money. The fourteenth deals with the duties of parents and the vice of avarice. The fifteenth is a not very powerful satire, its subject being a case of cannibalism in Egypt. The sixteenth (incomplete) is a eulogy of the life of a soldier.

Juvenal is the greatest of all Roman satirists. He made satire a serious and dignified form of literature, in his own words "satire put on the high buskin" of tragedy. His chief qualities are his power of drawing realistic pictures, and his mastery of incisive phrases. Some of his masterly epigrams and phrases are as well known as any Latin quotations, even quotations from Horace and Virgil, though their Juvenalian origin is not always recognized. Such are

quis tulerit Gracchos de seditione querentes?

—a line peculiarly applicable to Irish politics—

nemo repente fuit turpissimus.

rara avis in terris, nigroque simillima cycno.

quis custodiet ipsos custodes

and

maxima debetur puero reverentia.

Juvenal's great literary gifts and his honesty of purpose as a moralist have made his fame secure, and, as well as his purely literary interest, he gives us more information about the life of his time than almost any other author. — BIBLIOGRAPHY (Editions): J. E. B. Mayor's monumental edition of thirteen satires is the standard edition. Less overwhelming are the editions by J. D. Duff and by E. G. Hardy. (Translations): There is a standard but unsatisfactory translation by Gifford, published in 1802. There is also one by A. Leeper, and a remarkably faithful one by A. F. Cole.

JUVENILE OFFENDERS. A juvenile offender is a young person apparently under sixteen years of age who has been apprehended. A child under seven years is not deemed capable of crime. In the Children Act, 1908, Part V, provisions have been made which have for their object the reclamation of the offender in preference to his punishment. Unless in the case of the committal by a juvenile offender of a grave crime such as homicide, or of the desirability of his removal from the influence of a criminal, or of his release being likely to defeat justice, and unless he can be brought before the court forthwith, he may be released on bail, and if detained, must be kept apart from adults under detention.

On a remand or committal for trial, he must, whenever possible, be detained in a special place of detention and not in jail. The parent or guardian may be ordered to attend in court, and may be fined instead of the offender if he has been at fault in not exercising due care over him. Juvenile courts are to be held apart from the ordinary courts, and the public are not admitted except by leave of the presiding judge.

Custody in a place of detention is a substitution for imprisonment, to which only a person between fourteen and sixteen years of age of an unruly or depraved character can be sentenced. On the further methods by which the court may deal with young offenders, *see* the article FIRST OFFENDERS.

JUXON, William, English prelate, born 1582, died 1663. After studying at St. John's College, Oxford, he became a student of Gray's Inn, with the view of qualifying for the Bar, but took orders and obtained livings, first in 1609 at Oxford, and then in 1614 at Somerton.

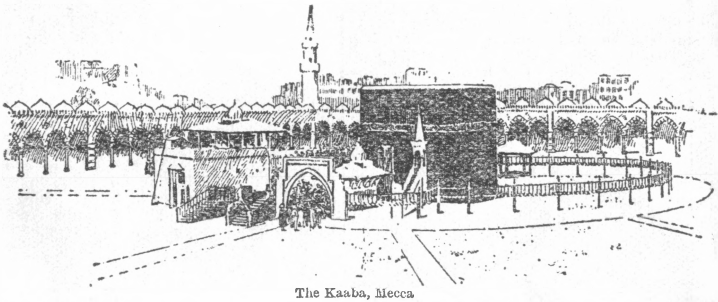
In 1621 he succeeded Laud as president of St. John's College; in 1627 was appointed vice-chancellor of the university, and about the same time chaplain-in-ordinary to Charles I, who gave him the deanery of Worcester, and then the bishopric of London (1633).

He attended the king at his execution, and administered the last consolations of religion to him. His fidelity cost him his bishopric, but at the Restoration he was made Archbishop of Canterbury.

K

K, the eleventh letter of the English alphabet, representing a guttural articulation, the surd consonant corresponding to the sonant *g*. In Old-English this letter was only used occasionally, *c* being regularly used instead. So also in Latin, *k*, borrowed from the Greeks, was little used, its place being supplied by *c*. The Italians, Spaniards, and Portuguese have banished the letter entirely from their alphabet. The French use it only in a few words derived from the Greek, foreign proper names, &c.

KAABA, the 'House of God' in the centre of the Harem (courtyard) of the Great Mosque at Mecca, to which all Mahommedans, no matter where they may be, turn their faces at time of prayer, and which they also endeavour to visit at least once in a lifetime, there to perform the prescribed ceremony in accordance with the laws of the Prophet.



The Kaaba, Mecca

All Mahommedans believe that the Kaaba was the first edifice ever erected for the worship of God, and that it is built upon holy ground where Adam, having been thrown out of Paradise, worshipped God in a tent provided by the Archangel Gabriel for that purpose.

Seth, the son of Adam, afterwards built a clay house, which was rebuilt by Abraham, restored by the Kuraish (the chosen people) some years before the birth of Mahomet, and destroyed by storm about thirty-five years later. In 1627 a new building was erected, and this is supposed to have been destroyed and rebuilt upon at least a dozen different occasions up to the present time.

The building itself is square in shape, 14 yards long, 11 yards broad, and 16 yards high (outside measurements), and has a door of aloe wood which is plated over with solid silver and studded with silver nails. Inlaid at the eastern end of the southern wall is the famous *Black Stone*, which fell, with Adam, out of Paradise, whence it was returned during the flood (it is reputed to float on water), but was brought back again by Gabriel and given to Abraham, who set it where it now stands.

In the year 278 of the Hegira the Karmathians carried it off, but restored it to the Kuraish some twenty years later. It is quite black and concave, and lies in a silver box some 20 inches square, set just high enough in the wall to be kissed readily. Originally the stone was of a milky-white colour, and its discoloration is popularly believed to be purely superficial, and due entirely to the sins of mankind or to the kissing of the multitude.

The Kaaba is only open at certain times, and particularly upon the 10th day of *Muharram*, when men only are admitted, women having the exclusive right of entry upon the following day. During the *Hajj* days it is draped in an *ihrām* (*see* HOLY CARPET), as are the pilgrims; and the *Tewaff*, or encompassing of the Kaaba, which must be done seven times by all pilgrims, commences from the sacred stone.

KABUL (kä-bŭl'), **CABUL**, or **CABOOL**, capital of the Kingdom of Afghanistan, 165 miles from the Indian town of Peshawar, 600 miles

from Herat, and 290 miles from Kandahar. It stands on the Kabul River, at an elevation of 6,800 feet above sea-level, overlooked by hills and adjacent to fertile plains. It consists mainly of mud houses with flat roofs, but buildings of a superior class have been erected, including the palace of Abdur Rahman, to whom the city also owes a new bridge and other works, such as improved streets and new roads.

The bazaar forms the chief street, being of great size. The Bala-Hissar, or citadel, is now of no importance. Kabul carries on a considerable trade with India through the Khyber Pass, and there is also a trade with Central Asia, Persia, &c. It was taken by the British in 1839 and in 1842, and on the occasion of a subsequent war with the British in 1879 Kabul was twice taken by their troops. (*See* AFGHANISTAN). Pop. about 80,000.

The Kabul River rises in Afghanistan, passes through the Khyber Pass into India, and falls into the Indus at Attock. Length, 300 miles.

KADIAK, or **KODIAK,** an island of Alaska, with large salmon canneries supplied almost entirely with fish from Karluk River. It has an extensive trade in furs from large bears found on the island. The inhabitants resemble the Eskimo in customs, and the climate is damp and unwholesome.

KADUNA, the chief town and administrative centre of Northern Nigeria.

KÆMPFER (kămp'fĕr), **Engelbrecht,** a German traveller and physician, born 1651, died 1716. As secretary to a Swedish embassy, and afterwards as surgeon in the service of the Dutch East India Company, he travelled extensively in the East. His comprehensive *History of Japan,* translated from his manuscripts into English in 1727, was, for a very long period, the only reliable source of information about that country.

KAFFA, or **GOMARA,** an Abyssinian dependency, inhabited by one of the Galla tribes. It is supposed to be the home of the coffee-plant, which grows wild on the slopes of the Kaffa hills. The chief town is Bonga.

KAFFIR-BREAD, the South African name of Encephalartos, a genus of Cycads, the interior of the trunk and of the ripe cones being used as food by the natives.

KAFFIRS (from Ar. *Kafir,* infidel or unbeliever), the principal race inhabiting South-Eastern Africa, a branch of the great Bantu family. The name is now chiefly restricted to the tribes occupying the coast districts between Cape Province and Delagoa Bay. They differ from pure negroes in the shape of the head, it being more like that of Europeans; in the high nose, frizzled hair, and brown complexion, which becomes lighter in shade in the tribes of the more southern districts.

They are a tall, muscular race, the average height being from 5 feet 9 inches to 5 feet 11 inches, and frugal and simple in their habits. Their chief occupation is raising and tending cattle, and hunting; garden and field work is mainly performed by women. They are of a peaceful disposition, but in times of war they displayed considerable bravery, tactical skill, and dexterity in the handling of their assagais or spears, shields, and knobkerries, as has been shown in their past engagements with the British forces.

There are several distinct branches or families of Kaffirs; but the tribes which events have specially brought to the front are the Pondos, the Fingoes, the Zulus, and the Swazi. Kaffirs, especially of the Zulu tribe, are distributed in large numbers over Natal and Cape Province, and have become to some extent civilized.

Frequent hostilities have taken place between the British and one or other of the Kaffir tribes, beginning almost with the first acquisition by Britain of the Cape Colony. The first Kaffir War was in 1811–2, the next in 1818–9.

In 1834–5 a serious Kaffir War was carried on, resulting in the expulsion of the Kaffirs beyond the Great Kei, but they were soon allowed to return. Another war (the fourth) broke out in 1846, and lasted nearly two years, with much suffering to both colonists and Kaffirs. Its result was an extension of territory in the north and east, a portion between the Cape Colony and the Kei being reserved for the natives, and called British Kaffraria.

In 1850 a Kaffir outbreak took place, and a fierce war followed, ending in 1853, soon after which British Kaffraria was made a Crown colony. A sixth war occurred in 1877–8, owing its origin to disputes between the two tribes of the Fingoes and Gcalekas. *See* ZULULAND.—BIBLIOGRAPHY: H. H. Parr, *A Sketch of the Kaffir and Zulu Wars*; G. M. Theal, *History of South Africa before* 1795.

KAFFRA'RIA, literally the country of the Kaffirs, a name once applied to a large part of South-Eastern Africa, but now limited to the coast district between the Great Fish and the Great Kei Rivers. A tract of land south-west of the Great Kei used to be

known as British Kaffraria, but in 1865 it was incorporated in Cape Colony as two districts, namely, King William's Town and East London. *See* KAFFIRS.

KAFIRISTAN', or the country of Kaffirs (infidels), an Eastern province of Afghanistan, between India and the Hindu Kush. It is very mountainous, especially the interior, and inhabited by a nation (the Siaposh) formed of different tribes, varying considerably in complexion. They live chiefly by cattle-raising and agriculture. Although hemmed in by Moslems, they have, excepting a few border tribes, resisted the spread of Islam.

Their religion is a debased form of idolatory with an admixture of ancestor-worship and fire-worship. Polygamy is practised, and they dress themselves in goat-skins, or fabrics woven from goats' hair, black being the almost universal colour. Kafiristan was occupied by the Afghans in 1896.

KAFTAN, or **CAFTAN,** a long loose vest or gown worn under a long cloth coat throughout the Levant. It is tied round the waist with a girdle.

KAFUE, a river of Northern Rhodesia, rising on the borders of the Belgian Congo, and after a course of *c.* 400 miles joining the Zambezi.

KAGOSHI'MA, a town of Japan, at the southern end of the Island of Kyushu, on the Kagoshima Gulf. It was burnt in 1877 during the great Satsuma Rebellion, but rebuilt afterwards. Pop. (1930), 137,236.

KAIETEUR FALLS, a waterfall, 741 feet high, on the Potaro River, British Guiana.

KAIFENG, or **KHAIFONG,** a town in Central China, capital of the province of Honan, near the Hwang Ho. Pop. 200,000.

KAILAS (kī-läs'), a sacred mountain of the Hindus, on a spur of the Himalayas in Western Tibet, near the sources of the Indus and Sutlej. It is a place of pilgrimage for all Hindus and Tibetan Lamas or priests, who crawl on hands and knees round the base, some 28 miles in circumference, a proceeding which occupies three weeks. Height (approximately), 22,000 feet.

KAILYARD SCHOOL, name given to writers of sentimental fiction about humble Scottish life. The term was originally applied by J. H. Millar, in reference to the song, "There grows a bonny briarbush in our kailyard." S. R. Crockett, Ian Maclaren (John Watson), and Sir James Barrie have been included in this category.

KAINITE, a mineral hydrous chloride of potassium with magnesium sulphate. Potassium content, 15·7 per cent; calculated as potash, 18·9 per cent. It is found along with beds of rock-salt, especially in the Stassfurt area of North Germany. It is valuable in a crude state as a manure, and for the manufacture of potassium sulphate.

KAIRWAN (kīr-wân'), a town of Tunisia, 80 miles S.S.E. of the capital, in a barren sandy plain, and surrounded by a brick wall with many towers and five gates. It ranks second only to Tunis in trade and population, and is one of the holy Mahommedan towns, being formerly almost inaccessible to Christians.

Under French rule it has been connected with Tunis by a good road and also by railway with Sousse, and a water-supply has been introduced. Kairwan was the first seat of the Saracenic empire in Barbary, and relics of its ancient grandeur still abound. Pop. 19,000.

KAISARIA (kī-sâr-ē'yâ) (ancient CÆSAREA), or **KAYSERI,** a town of Turkey in Asia Minor, at the foot of snow-capped Mount Ergish (Argæus), (12,000 feet); surrounded by a dilapidated wall. Pop. 39,134.

Kaisaria is also a village of Palestine, 32 miles north of Jaffa. It is the *Cæsarea* or *Kaisaria Sebaste* (13 B.C.) of the Romans, was the most important city of Palestine, was fortified by Louis IX (France) in 1251, and was destroyed by Beibars (1265). It was occupied by British troops during the European War, Sept., 1918.

KAISER (Gr. *Kaisar*; Lat. *Cæsar*), the German equivalent for emperor. The title of 'Kaiser des heiligen römischen Reiches deutscher Nation' was borne by the German and Austrian Emperors from 962 to 1806, when Francis II, who since 1804 was already styling himself Kaiser of Austria, abandoned the former title. In 1871, after the Franco-Prussian War, King William I of Prussia assumed the title of Kaiser of Germany (Deutscher Kaiser), which remained in the House of Hohenzollern until the Revolution of 1918.—Cf. Viscount Bryce, *The Holy Roman Empire.*

KAISERSLAUTERN (kī'zêrz-loutêrn), a town in the Bavarian Palatinate, on the Lauter. It has manufactures of woollens, cottons, hosiery, stoneware, sewing-machines, leather; breweries, paper-mills, and ironworks. In 1793 and 1794 fighting took place near Kaiserslautern between the Prussians and the French. Pop. 59,336.

KAISER WILHELM'S LAND, the northern section of South-East (late German) New Guinea; area, 70,000 sq. miles; pop. about 200,000. *See* NEW GUINEA.

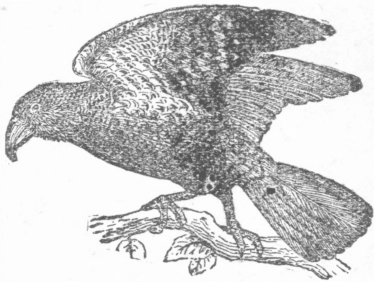
KAITHAL, an ancient town of India, Punjab, Karnal district; became British in 1843, and is connected by tradition with *Hanuman*, the monkey-god. The town has some local trade, and manufactures lac ornaments, toys, and saltpetre. Pop. 13,000.

KAKA (*Nestor meridionālis*), a New Zealand parrot, of a dusky colour, which feeds on fruits, insects, &c., and is semi-nocturnal in habits. The kea, another bird of this genus (*N. notabilis*), attacks sheep, biting into their backs with its strong curved bill, and endeavouring to reach the kidney fat. Pecking at sheep-skins is believed to have originated this destructive habit.

Kaiser William II

KAK'ODYLE, or **CACODYLE,** a metayl derivative of arsenic, $As_2(Ch_3)_4$. It is a clear liquid heavier than water, with an insupportably offensive smell and poisonous vapour. Its vapour when mixed with air explodes if heated above 50° C. *See* ALKARSIN.

KALAHA'RI, a desert region in South Africa, north of the Orange River, chiefly in Bechuanaland. It is very flat, subject to long-continued droughts, and has only dried-up river beds. But an abundant supply of water-melons and some remarkable varieties of tubers, together with large herds of antelopes and other game, provide ample subsistence to the Bushmen and Bakalahari inhabiting this region. The Kalahari was first traversed by David Livingstone in 1849.



Kea (*Nestor notabilis*)

KALAMA'TA, a seaport of Greece, in the Morea, capital of the monarchy of Messenia, at the head of the Gulf of Corone or Messenia. It is the seat of an archbishop, and has an export trade in wool, oil, silk, and figs. Pop. 28,955.

KALAMAZOO', a town, county, and river of Michigan, United States. Kalamazoo city is situated in a fertile agricultural district, on the river of the same name, which supplies some of its numerous factories with water-power; chief manufactures: paper, flour, furniture, and agricultural implements. Pop. (1930), 54,786.

KALANCHOE (-lank-), a genus of robust herbs or small shrubs, ord. Crassulaceæ, natives mainly of tropical Africa. Some are very handsome plants when in bloom, and several fine hybrids with pink or red flowers in cultivation.

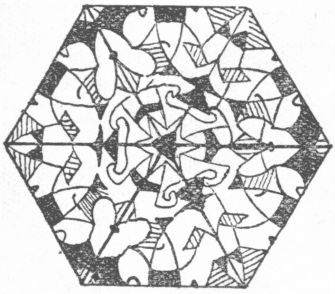
KALAT. *See* KELAT.

KALEIDOSCOPE (ka-lī'-), a well-known optical toy invented by Sir David Brewster about 1816, by which an infinite variety of symmetrical, and often beautiful, coloured designs is obtained.

The ordinary kaleidoscope consists of a tube containing two glass plates acting as mirrors, which extend along its whole length and make an angle of 60° with one another. One end of the tube is closed by a metal plate with a small hole at its centre, to which the eye is applied; at the other end there are two plates, one of ground, the

other of clear glass (the latter being next the eye), with a number of pieces of coloured glass or beads lying loosely between them.

When the eye is applied to the aperture, the mirrors produce a beautiful symmetrical figure, and when the tube is turned about or shaken, new images, always symmetrical, are formed. This arrangement may be modified in various ways. The instrument has been used by designers of patterns for printed calicoes.



Kaleidoscopic Pattern

KALGAN, or Chang-kia-kow, a fortified town of China, province of Chihli, on the overland trade route between Peking and Russia. There is a wireless telegraph station here. Pop. estimated at 30,000.

KALGOORLIE, a town of Western Australia, connected by railway with Perth and Coolgardie; head-quarters of a gold-mining district. Pop. (1931), 5,722.

KALI, a Hindu goddess, one of the forms of the consort of Siva, and therefore in some respects corresponding to Durga and other deities. She is represented as black, with four arms, wearing a necklace of skulls, and the hands of slaughtered giants round her waist as a girdle.

Her eyebrows and breast appear streaming with the blood of monsters she has slain and devoured. One hand holds a sword, another a human head. She is the goddess of death and destruction, and goats and other animals are sacrificed on her altars. Ancient Hindu books even enjoined human sacrifices to this goddess.

KĀLIDĀ'SA, one of the greatest Indian poets and dramatic writers, who lived, according to tradition, in the first century B.C., but some authorities assert that he flourished several centuries after the Christian era. His best production is the drama *Śâkuntala* (The Fatal Ring), which was first translated into English by Sir W. Jones (Calcutta, 1789), and at once aroused in Europe attention to Sanskrit literature.

He was also the author of two other plays—*Vikramorvaçî* (The Hero and the Nymph) and *Mâlavikâ and Agnimitrâ*—while two epics and other works are ascribed to him, some of which have been translated.—Cf. A. A. Macdonell, *History of Sanskrit Literature.*

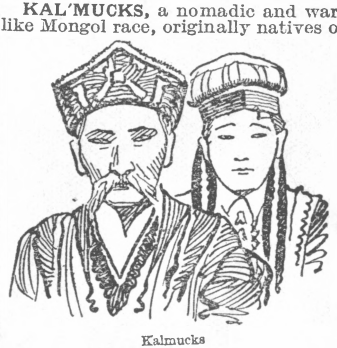
KALINJAR, a village and hill fort of India, United Provinces, Banda district, a place of great antiquity and sanctity, with tanks, caves, temples, tombs, and statues.

KALISCH (kā'lish), or **KALISZ,** a town of Poland, near the Prussian frontier, capital of the former province of Kalisch. The town, occupied by the Germans in 1914, and used as a base for the attack on Lodz, is of great antiquity, being founded in A.D. 655, and was for a long period the residence of the Grand-Dukes of Poland, whose palace still exists. It is a trade centre, and has various manufactures. Pop. (1931), 55,113.

KAL'MIA, a beautiful North American genus of shrubs, with cup-shaped rose or purple flowers disposed in corymbs, and belonging to the nat. ord. Ericaceæ, or heaths. Its trunk sometimes attains a diameter of 3 inches; the wood is very hard, closely resembling box.

KALMUCK REGION. *See* RUSSIA.

KAL'MUCKS, a nomadic and warlike Mongol race, originally natives of



Kalmucks

the territory of Central Asia between the Koko-Nor and Tibet, now inhabiting not only parts of China, but also occupying districts of Siberia and European Russia, where they settled under Russian dominion on the Ural, Don, and Volga, and in the government of Simbirsk. They have been great warriors from very early times, fought many fierce battles with the

Tartars, with the Chinese, and among themselves, and made predatory expeditions as far west as Asia Minor, and as early as the eleventh century.

Many of the Russian Kalmucks have been converted to Christianity. They are intrepid soldiers and splendid horsemen.

Physically the Kalmucks are small of stature, broad-shouldered, with small round heads, and the narrow oblique eyes characteristic of the Mongolian race. Their language is a branch of the Mongol Ural Altaic family. They number altogether perhaps 700,000, of whom more than half are under Chinese rule.—Cf. Sir H. H. Howorth, *History of the Mongols*.

KALOCSA (kä'lot-shä), a town of Hungary, near the Danube; it has a Roman Catholic archbishopric, with fine cathedral and episcopal palace. Pop. 11,811.

KALU'GA, a government and town of European Russia. The government is bounded by those of Moscow, Smolensk, Tula, and Orel, has an area, mostly flat and sandy, of 11,942 sq. miles, and a pop. of 1,387,100. The central parts are covered with immense pine and fir forests; the rest is poorly cultivated, producing chiefly grain, hemp, and flax. Iron ore and a poor kind of coal are also raised.

The town stands on an elevation on the right bank of the Oka, a navigable river, 114 miles S.W. of Moscow, has rope and canvas factories, and trades largely with Germany in leather, oil, and candles. Pop. 51,565.

KAMA (kä'ma), the Hindu god of love, corresponding generally to the Greek Eros and Roman Cupid. He appears as a beautiful youth riding on a parrot or a sparrow, the symbol of voluptuousness, generally carrying a bow with a string formed of bees, and having five arrows, each tipped with a flower that is supposed to have some amorous influence.

Dancing girls or nymphs bear him company, and one carries his banner, the emblem on which is a fish or marine monster on a red ground. Once he tempted Siva to sin, and the enraged god reduced the tempter to ashes by a gleam from his third eye. He is therefore known as the bodiless god. His wife is Rati, or Pleasure.—Cf. Donald A. Mackenzie, *Hindu Myth and Legend*.

KAMA, the largest tributary of the Volga, rises in the Russian government of Viatka, and after a course of 1,150 miles flows into the Volga, 40 miles south of Kasan. Part of it is navigable for steamers, and ordinary barges can proceed as far as Perm.

KAM'ALA, a drug long known, under various names, to Indian and Arab physicians as a specific against tape-worms; introduced into the *British Pharmacopœia* in 1864, but now superseded by other anthelmintics.

KAMCHATKA, or **KAMTSHATKA,** a large peninsula in North-Eastern Siberia, U.S.S.R., by whom it was first colonized at the end of the seventeenth century. On the east it has the North Pacific Ocean, and on the west the Sea of Okhotsk; area, 104,260 sq. miles.

Lofty mountain ranges extend the entire length of the peninsula, and have many active volcanoes. A number of hot springs also exists. The climate is very severe. Excepting

Kama or Kamadeva

in the valley of the Kamchatka River, the most fertile and populous settlement, the soil is but ill adapted for cultivation.

The chief wealth of the country lies in its fur-producing animals, including the sable, the Arctic fox, the beaver, and the bear. Game and fish of all kinds abound, and form the staple food of the inhabitants.

The Kamchadales, once the predominant race of the peninsula, are a branch of the Mongol family, a low type physically and morally, and their food consists mainly of fish seasoned with whale and seal fat. They believe in a creator and the immortality of the soul (including animals).

They use dogs for draught purposes, and not the reindeer, like their neighbours. The Koryaks are a wandering tribe, living in the northern districts, and subsisting almost exclusively on the produce of the reindeer. The entire population is about 31,804.

KAMENETS' PODOLSKI, a fortified

town of Russia, capital of the province of Podolia, on the Smotritz. Pop. 52,100

KAMENZ (kä'ments), a town of Germany, in Saxony, birth-place of Lessing. Pop. 11,165.

KAMES, a name given to long winding banks and ridges of gravel and sand in Scotland and elsewhere, formed by outwash from the fronts of retreating glaciers of the Ice Age.

KAMET, a Himalayan peak (25,447 feet), situated in the United Provinces, India. It was climbed by a British expedition in 1931, and is the second highest peak in the British Empire.

KAMPALA or **MAKERERE,** a small but extremely important town, capital of Buganda, Uganda. It has a University College.

KAMPEN, a town of the Netherlands, on the Yssel, near where it enters the Zuider Zee. Pop. 19,838.

Kangaroo (*Macropus giganteus*)

KAMPTEE (käm-tē), or **KAMTHI,** a town of India, Central Provinces, Nagpur district, with a fine bridge over the Kanhán River, and a Protestant and a Roman Catholic church. Pop. 20,226.

KAMRUP (käm-röp'), a district of Assam, in the Brahmaputra valley; area, 3,857 sq. miles. Pop. 668,000.

KANAGAWA, in the suburbs of Yokohama, Japan, was formerly an important Japanese seaport, and the first to be opened as a treaty-port, for the free entrance of foreigners, in 1859. At this time Kanagawa was a town of considerable size, and Yokohama merely a tiny fishing-village; but by some decision of the Japanese Government, Yokohama was made the treaty-port instead of Kanagawa, and subsequently grew so rapidly that Kanagawa merged with it as a suburb.

KANA'KA, a Polynesian word originally used to describe the native inhabitants of the Sandwich Islands, but now applied to all South Sea Islanders of Polynesian-Melanesian extraction.

KANAUJ. *See* KANOJE.

KANAZA'WA, a town of Japan, near the north-west coast of the main island, and north-west of Tokyo, with manufactures of silks and porcelain. Pop. (1930), 157,311.

KANCHENJUNGA or **KANCHANGANGA,** world's third highest mountain. Situated in the Himalayas near the boundaries of Nepal and Sikkim, it is 75 miles from Everest. Its chief peaks, 28,150 feet and 27,800 feet high, can be seen from Darjeeling. In 1930 an international expedition ascended the mountain, but was compelled by the weather to return when it had reached a height of 24,400 feet. It has five peaks and the word means "the five treasure houses of the great snows."

KANDAHAR', or **CANDAHAR,** a town of considerable commercial and strategical importance in the south of Afghanistan, on the direct route to India. It was held by British forces in 1839–42, and 1879–81. The town lies 3,484 feet above the sea, and has a large transit trade. Pop. 60,000.

KANDA'VU, the southernmost island of the Fiji group. It has a fine natural harbour, with a port of call for steamers, and is surrounded by the Kandavu island group. The area is 124 sq. miles, and the pop. 15,000.

KANDERSTEG, tourist resort in Switzerland. It is in the Bernese Oberland and stands nearly 4,000 feet high.

KANDY, town of Ceylon. Situated high among the mountains of the interior, it is 75 miles by railway from Colombo, and is noted for its temples, especially the famous Buddhist Temple of the Tooth and its royal tombs. It was once the capital of the native kingdom of Kandy, and was annexed by Britain in 1815. Pop. (1931), 36,541.

KANEM, a former African state, north-east of Lake Chad, now a district of Chad Colony, French Equatorial Africa.

KANGAROO, the common name of a number of animals belonging to the marsupial order of mammals, indigenous to Australia and some of the islands to the north of that continent, and first made known to Europe by Bruyn in 1711, and afterwards by the writings of Captain Cook and Sir Joseph Banks.

The most noticeable feature about the kangaroo is the disproportion between the upper and lower parts of the body. The head is small, deer-like in shape, with large ears; the fore-legs small and five-toed; the hind-legs very large and powerful, with four toes only on the feet. The tail is long, thick at the base, and helps

to support the animal when sitting erect, the usual posture when not feeding; it also assists the hind-legs in their long leaps (from 10 to 15 feet).

The young are born very immature, and protected and nourished for about eight months in the *marsupium*, or pouch, into which the nipples of the mammary glands open. Kangaroos are herbivorous, and, where still plentiful, a serious pest to squatters, whose rifles have, however, considerably reduced their number. The hind-quarters of the large species supply a tolerable substitute for venison, while their tails make excellent soup, and their skins good rugs and leather.

The kangaroo includes many species, varying in size from a hare to a large sheep, and remains of still larger and extinct species have been found in the Pleistocene deposits of Australia. The larger and most common kinds belong to the genus Macrŏpus, and include the giant kangaroo (*M. giganteus*) and the still larger red kangaroo (*M. rufus*). Wallabies are smaller forms, some being species of Macrŏpus, while most belong to other genera. The tree kangaroos (Dendrolagus) are native to New Guinea and North Australia.

KANGAROO ISLAND, a long and barren island (area, 1,671 sq. miles) situated at the entrance to the St. Vincent Gulf, South Australia.

KANGAROO RAT (species of Potorous, Bettongia, and Æpyprymnus), more properly rat-kangaroo, diminutive species of the kangaroo family, differing from the kangaroo proper in possessing canine teeth in the upper jaw, in their nocturnal habits, and their food.

KANGRA, a large district of India, in the Punjab, belonging mainly to the Himalayan chain; area, 9,978 sq. miles. About a ninth is under cultivation, and large tracts are covered with forests. Pop. 770,000.—The town of **Kangra,** formerly known as Nagarkot, had a temple which was destroyed by an earthquake in 1905. Pop. 5,000.

KANIZSA (kän'i-shä), a market town of Hungary, district of Zala, with large distilleries, and fairs for grain, cattle, and pigs. This town is now called Nagy-Kanizsa, and is to be distinguished from Magyar-Kanizsa and Török-Kanizsa, both in Yugoslavia. Pop. 26,000.

KANO, a city of West Africa, Northern Nigeria, capital of the province of Kano and native town of the Hausa people, was annexed by the British in 1903. It is the seat of an Ameer, who governs under British protection and authority. The Ameer's palace covers over 33 acres. The town is walled, and is an important trading centre for groundnut and hides, and the silk, leather, and cotton manufactured by the natives. Pop. (of mixed nationalities), 67,000.

KANOJE (kə-nōj'), or **KANAUJ,** a town of India, United Provinces, on a plain near the Ganges. It was once the capital of a great empire, but now consists chiefly of ruins which extend over several miles, though there is also a modern town with some manufactures. Pop. 17,500.

KAN'SAS, one of the United States, bounded north by Nebraska, east by Missouri, south by Oklahoma and Indian Territory, west by Colorado; area, 82,158 sq. miles. It consists chiefly of undulating plains, well watered by the Kansas and Arkansas and other rivers, the Missouri forming the boundary on the north-east.

The soil is generally fertile, highly suitable for grain, vegetables, and fruit, and cattle-raising is carried on very extensively. The climate is mild, and the winter short, but violent winds and sudden changes of temperature often mar the spring season.

Although an agricultural state, Kansas has important and varied manufactures, the rivers supplying the motive power in many places. Bituminous coal, iron ore, lime, marble, lead, and salt are among the minerals, and coal is mined to a considerable extent. Education is well provided for, and there is a state university, an agricultural college, and other colleges and normal schools. It had 9,684 miles of steam and 570 miles of electric railway track in 1932.

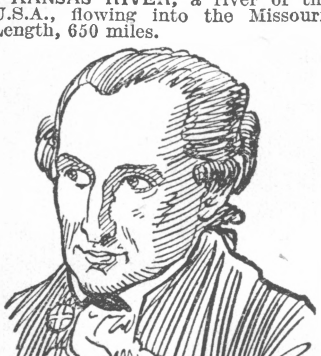
The chief towns are Leavenworth, Lawrence, Topeka, and Atchison; Topeka being the state capital. Kansas originally belonged to the Louisiana territory. Settlers had entered it in considerable numbers by 1853, and in 1860 it was admitted one of the states of the Union. Pop. (1930), 1,880,999.

KANSAS CITY, a town of Kansas, United States, county seat of Wyandotte county, on the Kansas and Missouri Rivers, in the midst of a rich agricultural region, and forming a centre in which numerous railroads meet, thus making it a great commercial emporium. As a live-stock market it is probably the first in the United States, and it is a great beef- and pork-packing centre, its grain trade also being large. Its manufactures are of importance. It has a university, Kansas City University (founded in 1896). Pop. (1930), 121,857.

KANSAS CITY, a city and port of Missouri, United States, in Jackson

county. Three railroad bridges span the Missouri River, and the city is an important railway junction. Its trade in live stock and grain is considerable, and its manufactures include agricultural implements and clothing. Among its public buildings are the custom-house, the Board of Trade building, the live-stock exchange, and the Convention Hall. Pop. (1930), 399,746.

KANSAS RIVER, a river of the U.S.A., flowing into the Missouri. Length, 650 miles.



Imanuel Kant

KANSU, an inland province of North-Western China; area, 125,483 sq. miles. It is mountainous, some of the peaks rising more than 10,000 feet above sea-level, and is watered by the Hwang Ho. Wheat, barley, and millet grow, and large flocks and herds are maintained. Lanchowfu is the capital. Pop. (estimated), 7,422,818.

KANT, Immanuel, a celebrated German philosopher, the founder of the 'critical' or Kantian philosophy, born on 22nd April, 1724, at Königsberg, Prussia, died at the same place 1804. Kant himself believed that his grandfather was a Scottish immigrant, the original form of whose name was Cant. There is, however, no documentary evidence to prove this. He early showed great application to study, and was sent to the Collegium Fredericianum, and then (in 1740) to the university of his native city. His progress at college and at the university was rapid and brilliant, his studies embracing in particular mathematics and physics, as well as philosophy.

Leaving the university after three years, he engaged in tuition, and it was not till 1755 that he took his degree. Soon after this he was appointed one of the teachers in the Königsberg University, and lectured on logic, metaphysics, mathematics, and natural philosophy, to which, at subsequent periods, he added natural law, moral philosophy, natural theology, and physical geography. In 1770 he became a full professor, obtaining the chair of logic and metaphysics, a post that he occupied till 1797.

It is impossible within our space to give anything like an exposition of the philosophy of Kant, which has profoundly influenced all subsequent philosophical speculations. Whilst in his earlier works we notice the influence of Leibnitz and Wolff, Kant afterwards came under the sway of English empiricism. Dissatisfied, however, with the dogmatisms of Wolff and the scepticism of Hume, with the doctrines both of idealism and realism, which considered either mind or matter as the absolute, Kant, beginning to suspect all forms of metaphysical theory, set himself to investigate the field of metaphysics for himself, and in the first place proceeded to the examination of the origin, extent, and limits of human knowledge.

According to him, part of our knowledge is knowledge a priori, or original, transcendental, and independent of experience; part of it is a posteriori, or based on experience. What he calls the 'pure reason' has to do with the former. His great work named the *Kritik der reinen Vernunft* (Critique of Pure Reason; first edition, Riga, 1781) contains the foundation for his whole system of philosophy.

In the preface to a later work, the *Kritik der Urtheilskraft* (Critique of the Power of Judgment; Berlin, 1790), he defines pure reason thus: "Pure reason is the faculty to understand by a priori principles; and the discussion of the possibility of these principles, and the delimitation of this faculty, constitutes the critique of pure reason. In the first rank of such ideas as we do not derive from experience are *space* and *time*." Kant shows that all our perceptions are submitted to these two *forms*, hence he concludes that they are within us, and not in the objects; they are *necessary* and *pure intuitions* of the internal sense.

The three original faculties, through the medium of which we acquire knowledge, are *sense, understanding,* and *reason.* Sense, a passive and receptive faculty, has, as already stated, for its forms or conditions

space and *time*. Understanding is an active or spontaneous faculty, and consists in the power of forming conceptions according to such categories as unity, plurality, causality, &c., which categories are applied to objects of experience through the medium of the two forms of perception, *space* and *time*. Reason is the third or highest degree of mental spontaneity, and consists in the power of forming ideas. As it is the province of the understanding to form the intuitions of sense into conceptions, so it is the business of reason to form conceptions into ideas.

Far from rejecting experience, Kant considers the work of all our life but the action of our innate faculties on the conceptions which come to us from without. He proceeds in a similar way with morality: the idea of good and bad is a necessary condition, an original basis of morals, which is supposed in every one of our moral reflections, and not obtained by experience. He treats this part of his philosophy in his *Kritik der praktischen Vernunft* (Critique of Practical Reason; 1788).—BIBLIOGRAPHY: Kuno Fisher, *Immanuel Kant und seine Lehre*; F. Paulsen, *Immanuel Kant: his Life and Doctrine*; Sir J. P. Mahaffy, *Kant's Critical Philosophy for English Readers*; E. Caird, *The Critical Philosophy of Kant*; John Watson, *The Philosophy of Kant Explained*.

KANU'RI, or **KANO'RI,** a Sudanese people, who form the principal portion of the population of Bornu.

KA'OLIN, a name derived from a locality where the Chinese work a pure white clay used in the manufacture of porcelain. Kaolin is the result of the decomposition of granite rock, containing felspar, mica, and quartz. Similar clays, differing slightly in colour and in the percentage of constituents, are found at Schneeberg, in Saxony, furnishing the material of Dresden china; at Limoges, in France, employed for Limoges ware; and at St. Austell, in Cornwall, the source of supply for the British potteries.

In its natural state kaolin-earth somewhat resembles mortar; by washing and repeated filtration it is freed from quartz and other coarse ingredients, then dried and sent into the market cut into blocks. The fine separated material consists of the mineral *kaolin* or *kaolinite*, which is the basis of all clays. It is a hydrous aluminium silicate, $H_4Al_2Si_2O_9$, arising from the decay of alkali felspars, and occasionally crystallizing in minute six-sided plates.

KAPURTHALA (*ka-pört'ha-la*), a native state of the Punjab, India, between the Beas and the Sutlej Rivers; area, 598 sq. miles; pop. 316,757.—The capital, **Kapurthala,** lies 65 miles east of Lahore. Pop. 18,500.

KARA, the name of a bay, sea, and strait of the Arctic Ocean, south of Novaya Zemlya.

KARACHI. *See* KURRACHEE.

KARAFUTO. *See* SAKHALIN.

KA'RAÏTES, a Jewish sect, founded during the latter half of the eighth century by Anan Ben David, and which was for a long time the object of persecution by the orthodox Jews. They were originally known as Ananites, from the name of their founder, but in the ninth century the designation Karaïtes (Heb. *Karaïm*) was applied to them. They refuse to accept as divine or authoritative the traditions and doctrines of the *Talmud*, or those in the rabbinical writings, and adhere closely to the text and letter of the Old Testament. They are still found in Poland, Galicia, Alexandria, Cairo, Istanbul, Jerusalem, and Hit on the Euphrates; but their chief stronghold is in the Crimea, where there are about 12,000 or 13,000 of them.

KARAKO'RUM, or **MUSTAGH,** a mountain range in the north-west of the Himalayas, parallel to the main range, from which it is separated by the Upper Indus valley. It contains Godwin-Austen, or K_2 (28,248 feet), the second highest of the Himalayas. There is also a pass in this range, 18,000 feet above sea-level, on the direct route from India to Eastern Turkistan.

KAR'AMAN, a town of Turkey in Asia Minor, chief town of Karamania, on the Bagdad Railway. It is the ancient *Laranda*. Pop. 7,500.

KARAMA'NIA, or **CARAMANIA,** a region of Asia Minor. It is traversed from east to west by the Taurus range, covered with oak and pine forests, and watered by the Kizil-Irmak, the Syhoon, and other lesser rivers. The climate is genial, the soil rich, producing abundant harvests, and the vine and the fig grow in profusion. The chief occupation of the inhabitants, mostly Turkish, is the rearing of live stock. The capital is Konia.

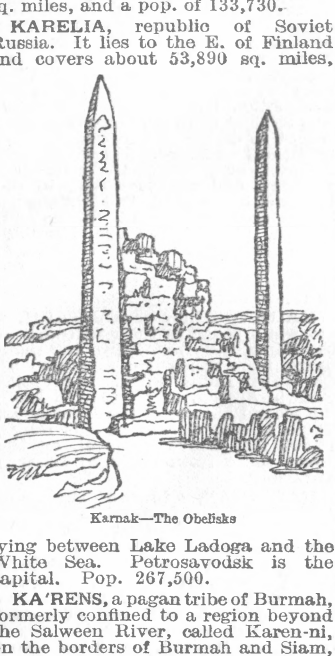
KARA SEA, a part of the Arctic Ocean, between Novaya Zemlya in the north-west and the Yalmal Peninsula of Siberia in the south-west. It has sometimes been used as a trade route for ships from Western Europe to Siberia.

KARATEGIN (*kä-rä-tä-gēn'*), a khanate of Central Asia, in the Tazhik S.S.R., formerly subject to

Bukhara, situated in the valley of the Surkhab. Fruit and corn are grown, but in winter the cold is intense. Pop. about 100,000.

KARAULI', a town of India, in Rájputána, capital of native state of the same name, surrounded by walls and a moat, and containing a palace and handsome temples. Pop. 20,000. —The state, which is under the superintendence of the Bhurtpore and Karauli Agency, has an area of 1,242 sq. miles, and a pop. of 133,730.

KARELIA, republic of Soviet Russia. It lies to the E. of Finland and covers about 53,890 sq. miles,



Karnak—The Obelisks

lying between Lake Ladoga and the White Sea. Petrosavodsk is the capital. Pop. 267,500.

KA'RENS, a pagan tribe of Burmah, formerly confined to a region beyond the Salween River, called Karen-ni, on the borders of Burmah and Siam, but now distributed over various parts of Burmah. They are an intelligent and industrious race, many of them having become Christianized through the agency of American missionaries. They are estimated at about 1,100,000.

KARIKAL', or **CARICAL**, a small French settlement in India, in the Carnatic, on the Coromandel coast, 150 miles s. of Madras. Area, 53 sq. miles; pop. 58,000.—**Karikal**, the capital, on the Cauvery delta, has a pop. of 16,499, and a large export trade, chiefly in rice.

KARLI', a celebrated Buddhist cave-temple of India, Poonah district of Bombay Presidency. It is rich in sculpture, and is divided like a church into nave and aisles, with an apse.

KARLSBAD, or **VARY KARLOVY**, health resort of Czechoslovakia, formerly in Austria. It is now known by its Czech name of Karlovy Vary. It lies on the River Tepla, at a high altitude, among picturesque surroundings, about 70 miles N.W. of Prague. Its warm mineral springs which have been famous since the 14th century, attract a large number of visitors. The buildings include pump rooms and concert halls, and there are gardens and other attractions. There are porcelain works, kaolin being found in the neighbourhood. Pop. (1930), 24,029.

KARMA'THIANS, once a powerful Mahommedan sect, founded in Irak by Hamdan Karmat during the ninth century, who adopted the doctrines of the Ismailis, and introduced communism among his rapidly increasing flock. Missionaries were trained to spread his creed, and one of them, Abu Saïd, gained a strong hold on the people of the Persian Gulf. The caliph, afraid of the influence of the new sect, sent an army for its suppression, but he was defeated, and Abu Saïd took possession of the whole country. His son Abu-Tahir, who succeeded him, made further conquests, and became master of almost all Arabia, Syria, and Irak; but under his successors this power rapidly declined, and was finally broken towards the end of the tenth century.

KARNAK, a village of Upper Egypt, forming, with Luxor, the site of the ancient city of Thebes. It contains the remains of a Great Temple founded by Usertesen I, and built of limestone and sandstone, with granite doorways. Other Egyptian monarchs added to the structure, and the Pharaohs spent nearly a century in the erection of a tremendous hypostyle hall. An earthquake in 27 B.C. destroyed part of the temple. Hatshepsut's obelisk, the loftiest discovered, stands here. It was about 189 feet in height, and is stated, by the hieroglyphics that adorn it, to have been quarried, shaped, and erected in seven months. There is also an avenue of ram-headed sphinxes and many other archæological remains. *See* THEBES.

KARNAL (*kar-nāl'*), an Indian town and district, in the Punjab; area of district, 3,153 sq. miles; pop. 800,000.—**Karnal**, the head-quarters of the district, trades largely with Delhi and Umballa. Pop. 22,845.

KARNUL', or **KARNOOL'**, a town of India, in the Presidency of Madras, situated in the fork formed by the

junction of the Hundri with the Tungabhadra, with a dismantled fort. Pop. 25,376.—The district has an area of 7,514 sq. miles; a pop. of 872,423.

KÁROLYI, Michael Adam George Niklaus, Count. Hungarian politician. Born at Budapest, 4th March, 1875, he entered Parliament in 1905, and in 1912 changed from Liberal to Radical views. After the outbreak of war in 1914, he tried to conclude a separate peace with the Allies. After the Hungarian revolution of 1918, Károlyi was made Prime Minister, and President in 1919. Unsuccessful in his peace treaty, he had to hand over the government to the Soviet of Bela Kun, and left Hungary for Czechoslovakia. He was found guilty of high treason and felony, and his estates confiscated.

KARROOS, the name given in South Africa to the elevated tablelands, 3,000 to 4,000 feet above sea-level, lying between the mountain ranges. The soil is shallow but rich, and during the rainy season, or when artificially watered, vegetation is most profuse. The Karroos form excellent pasturage for cattle, sheep, and Angora goats; and great tracts are now occupied as farms, the uncertain rainfall being supplemented by permanent springs and large reservoirs. The 'Great Karroo,' in Cape Province, extends from east to west for 300 miles, with a breadth of 70 miles.

KARS, a town of Turkey, capital of the vilayet of Kars, in Transcaucasia, in the former Russian government of the Caucasus. It was formerly a Turkish fortress, and the scene of several gallant defences. Captured and annexed by the Russians in Nov., 1878, it became the capital of a Russian province of the same name. Connected with Batoum and Tiflis by military roads, the fortifications were much enlarged and strengthened. During the European War, Kars was captured by the Turks in April, 1918. Pop. 38,806. *See* TRANSCAUCASIA.

KARSHI, a town of Bukhara, and a meeting-point of several trade routes; produces a superior quality of tobacco from plantations in the vicinity, and was once the favourite residence of Tamerlane. Pop. 25,000.

KARTIKE'YA, the Hindu god of war. He is represented riding on a peacock, with six heads and twelve hands, in which numerous weapons are brandished.

KARUN', a navigable river of South-Western Persia, falling into the Shatt el'Arab, or joint stream of the Euphrates and Tigris. Steamers can go up it as far as Ahwaz.

KARWAR', a seaport of India, Bombay Presidency, with a safe harbour and a good trade. Pop. 18,000.

KASGANJ', a town of India, United Provinces; well built, with a good trade in grain and sugar. Pop. 20,000.

KASHAN', a town of Persia, province of Kashan, in a fertile plain 90 miles south of Isfahan. It is regularly built, has many fine mosques, &c., and its silks, carpets, and jewellery are much esteemed. Pop. 15,000.

KASHGAR', a city of Chinese Turkistan, on the Kizil-Su, tributary of the River Tarim, which divides it into two parts, one called the 'old' and the other the 'new.' The ruins of ancient Kashgar, once an immense walled city, lie near here. Kashgar is

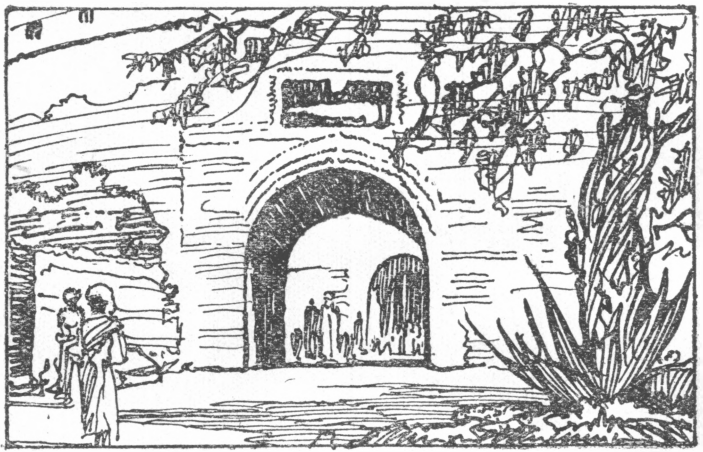
Kars Fortress

of some commercial importance. A wireless station was erected in 1919. Pop. 30,000.

KASHKAR, or PAMIR SHEEP (*Ovis poli*), a large species of sheep inhabiting the lofty plateaus of Central Asia. The male has very large horns bent circularly, while the female has horns resembling those of a goat.

KASH'MIR, an extensive principality in North-West India, subject to a ruler (the Maharajah) belonging to the Sikh race. The principality embraces not only Kashmir proper, but also Jamoo or Jummoo, Baltistan (Little Tibet), Ladakh, Gilgit, &c. The area is estimated at 84,258 sq. miles. It extends from about 32° to 37° N. lat., and from about 73° to 80° E. long., and is largely a region of mountains, containing magnificent glaciers. The Kunlun range bounds it on the north, one peak of which rises to the height of 28,265 feet. The country is watered by the Upper Indus and its tributaries, and by the Jhelum and Chenab.

Kashmir proper, which forms a small portion of the whole, is a valley surrounded by gigantic mountains, the Himálaya and Hindu Kush, and traversed by the River Jhelum (formerly Hydaspes). There are ten chief passes through the mountains into this valley, varying in height from about 9,000 to 12,000 feet. The elevated situation of the valley, and the mountains of snow which surround it, render the climate rather cold; but the region is well watered by streams and very fertile. Forests on the slopes, fields of corn, rice crops along the sides of the rivers, rich orchards, and an abundant growth of flowers distinguish the district, but



City Gate at Kashgar

the fruits of warm climates do not ripen here. Among its minerals are iron and plumbago. Sulphur springs are common. Earthquakes frequently occur, and in 1883 one caused the loss of thousands of lives.

Bears, leopards, wolves, the ibex, and chamois are among the animals. The flora has a strong affinity to that of Europe; the deodar cedar forms extensive and valuable forests. The common European fruits are grown, and attention is now being paid to the culture of the vine. The chief crops are wheat, barley, rice, and Indian corn, and two harvests are reaped in the year.

The chief manufacture was that of the celebrated Kashmir shawls, but it is not so extensive as it once was, since the establishment of manufactories at Amritsar in the Punjab, and elsewhere. The genuine Kashmir shawls owe their superiority to the material of which they are made, which is, properly speaking, not wool, but a fine kind of down with which the animals of this region are clad during the winter season, and which in length and fineness far surpasses the merino wool. This down is obtained in great quantities from the Kashmir goat, the yak of Tibet, and the wild sheep. It is spun by women and girls, and then passes into the hands of the dyers. From the dyers the yarns are passed to the weaver, and the shawl is woven in stripes, which are afterwards very skilfully sewed together. The average time taken to manufacture a good Kashmir shawl is from sixteen to twenty weeks. The Kashmir shawl dates back to the days of the Emperor Baber.

The inhabitants of Kashmir are a fine race physically, tall, strong, and well-built, with regular features. There are thirteen separate dialects in use. The Maharajah is independent, but his relations with other states are subject to the authority of the Government of India. The capital of the whole principality is Srinagar (or Kashmir), which is the Maharajah's usual residence and the largest town. The total revenue is estimated at £900,000, chiefly from land. The Government revenue is paid in kind, and the grain claimed by the State is stored in public granaries and sold at fixed prices. The population is 3,330,518, the majority of which are Mahommedans, although the ruling family is Hindu. In 1931 there was

serious unrest in the State, British troops being sent to restore order.

KASHMIR GOAT, a variety of the common goat remarkable for its fine downy fleece, said to be found in perfection only in Tibet in the neighbourhood of Lhasa, but also found in other parts of this region, including Ladakh, now a province of Kashmir. The colder the region where the goat pastures, the heavier is its fleece. A full-grown goat yields not more than 8 ounces, the fine curled wool being close to the skin. A large shawl of the finest quality requires 5 lb. of the wool; one of the inferior quality from 3 to 4 lb.

KAS'SALA, a town of the Sudan, near the frontier of Eritrea, occupied for a time by the Italians but ceded to the Anglo-Egyptian authorities; is of some importance as a military station. Pop. 10,000.

KASTAMOU'NI, the ancient **GERMANOPOLIS,** a town of Turkey in Asia Minor. Pop. 14,590.

KASUR', a town of India, Lahore district, Punjab, with manufactures of leather and a good trade. Pop. 31,018.

KATANGA, a province of the Belgian Congo, immediately north of Rhodesia. It is extremely fertile and abounds in minerals, chiefly copper, tin, and coal. Most Central African railways converge towards Katanga. Elizabethville is the capital. Area, 180,000 sq. miles; pop. *c.* 1,000,000.

KATHIAWAR, a peninsula of India, Bombay Presidency, forming the western part of the province of Gujerat; area, 23,445 sq. miles. Of this area 20,882 sq. miles with a pop. of 2,542,535 form the Kathiawar Agency, having under its control 181 states, most of them tributary to Britain or Baroda.

KATOOMBA, a town of New South Wales, Australia, 66 miles west of Sydney. It has coal-mines and is a tourist centre. Pop. (1931), 9,580.

KATOWICE, a great iron-founding town of Poland, in Silesia. Pop. (1931), 127,841.

KAT'RINE, LOCH, a picturesque and much-frequented lake, Scotland, county of Perth, 5 miles east of Loch Lomond; 10 miles long, in some places 2 miles broad, and encircled by lofty mountains and rocky ravines clothed with trees. At its east end is the celebrated pass of the Trossachs, rendered famous by Scott's *Lady of the Lake.* Through this pass a stream flows, carrying the surplus waters of the lake to Loch Achray. The water-supply of the city of Glasgow is drawn chiefly from Loch Katrine.

KATTEGAT. *See* CATTEGAT.

KA'TYDID (*Cyrtophyllus concavus*), several species of grasshopper of a pale-green colour, body about an inch long, found in some parts of North America, and so named from the love-call made by the males. This is produced by the friction of a sort of file at the base of the right wing-cover, which is scraped by the sharp edge of the left wing-cover. It can be heard on a quiet night a quarter of a mile away. The females respond by a single chirp.

KAUFFER, Edward M'Knight, American artist and designer. Born at Great Falls, Montana, in 1890,

Angelica Kauffmann

after an eventful life in America he began work at the Art Institute, Chicago, and then worked in Munich and Paris, and settled in London. He became expert at poster designing, and his boldness of design and keen sense of colour are found in the series of London's Underground Railway posters. His woodcut "Flight" (1922) is famous and he has edited *The Art of the Poster* (1924).

KAUFFMANN, Marie Angelica, a distinguished painter, born at Coire, Switzerland, 30th Oct., 1741, died at Rome 5th Nov., 1807. She received her early instruction from her father, himself a painter, and before the age of twenty she had become famous. After a study of the Italian masters, and while at Venice, she was induced to go to London (in 1765), and became one of the thirty-six foundation members of the Royal Academy (1768).

She is at her best in ideal figures: her faces are tender and elevating, her

grouping and draping excellent, but her design often lacks energy and firmness, while her colouring (the latest paintings excepted) is rather too brilliant. Among the pictures which she painted in England are: *The Mother of the Gracchi*, *The Sacrifice of Messalina*, and *Cupid and Psyche*. Among her best portraits are that of herself in the National Gallery, and Raphael Mengs and Lady Hamilton in the South Kensington Museum. —BIBLIOGRAPHY: G. de Rossi, *Vita di Angelica Kauffmann*; F. A. Gerard, *Angelica Kauffmann*.

KAULBACH (koul'bâh), **Wilhelm von,** German historical painter, born at Arolsen, Waldeck, in 1805, died at Munich of cholera in 1874. He studied at the art academy of Düsseldorf under Cornelius, whom he assisted in the execution of the frescoes of the Clyptothek or gallery at Munich, and subsequently succeeded as director of the Munich Academy.

His most ambitious pictures, with the exception of *The Madhouse* (1828), are to be found in a series painted between 1834 and 1863, and utilized in the decoration of the Berlin Museum, which depicts the progress of the human race in typical scenes from the great historic periods, and comprising *The Tower of Babel*, *Age of Homer*, *Destruction of Jerusalem*, *Battle of the Huns and Romans*, *The Crusades*, and *The Reformation*. He also produced a large number of portraits, designs, and illustrations of books, including the *Reineke Fuchs*, the Gospels, and the works of Shakespeare, Goethe, and Schiller.

As a colourist he was of inferior rank, his main strength lying in draughtsmanship and composition. In choice and handling of themes his range was great, and he deserves credit for the part he played in the revival of mural decoration. But the value of his work is often lessened by a straining after symbolism and allegory. He marks a transition from the idealism of Cornelius to the realism of more modern painters.—Cf. F. von Ostini, *Wilhelm von Kaulbach* (in *Kunstler Monographien*).

KAURI PINE (*Agathis australis*), a tree peculiar to New Zealand, and found there only at the northern extremity of the North Island. It reaches the height of 150 feet, and its timber is much valued for building purposes and for making furniture. The resin of this tree, the kauri gum, forms a valuable export, and is used in making fine varnish, &c. Most of it is obtained in a fossil state, by digging.

KAYE-SMITH, Sheila, English novelist. The daughter of Edward Kay Smith, a doctor at St. Leonards, she passed her early days in Sussex and soon gained a very intimate knowledge of the people there. In 1908 she published her first novel *The Tramping Methodist*. This was a success and others followed, dealing in the main with Sussex life. They include *Starbrace*, *Sussex Gorse*, *Tamerisk Town*, *Green Apple Harvest*, *The End of the House of Alard*, *Saints in Sussex*, *Iron and Smoke*, *The Village Doctor*, *Shepherds in Sackcloth*, *Susan Spray* and *The Children's Summer* (1932). In private life Miss Kaye-Smith is the wife of Rev. J. P. Fry.

KAZAN', a town of European Russia, with a university, and a cathedral contained within a kremlin or citadel of some historic interest. This is the Kazan of the opera *Boris Godounov*, and is the capital of the district having the same name. There are some manufactures, but the town is more renowned as a seat of Oriental learning. Pop. (1926), 202,000.

KAZ'VIN, a town of Persia, in the province of the same name, forming an extensive plateau some 4,000 feet high. The town forms a junction for the trade routes to Teheran out of Resht (on the Caspian) and Tabriz. From time to time it has been devastated by earthquakes. It has some trade in fruit, cottons, and horses. During the European War the town was occupied by the British (in 1918). Pop. 30,000.

KEAN, Charles John, actor, son of the tragedian Edmund Kean, born at Waterford 1811, died at London 1868. He was educated at Eton, but, being thrown on his own resources in 1827, he took to the stage, and made his debut at Drury Lane as Young Norval in Home's *Douglas*. In 1830 he visited America, established his reputation, and reappeared as a leading actor in London in 1838, among his parts being Hamlet and Richard III. He married the actress Ellen Tree in 1842, revisited the United States in 1845, and in 1851 became sole lessee of the Princess's Theatre, London, where he put some of Shakespeare's plays on the stage with a splendour never before attempted.—Cf. C. Scott, *The Drama of Yesterday and To-day*.

KEAN, Edmund, the most brilliant tragedian of his age, was born in London 17th March, 1787, died at Richmond 15th May, 1833. His parents were connected with the theatrical profession. At two years of age he was placed in a pantomime, at seven he went to school, but ran away, and for a short time he was a cabin-boy in a vessel. Returning to the stage, he ultimately obtained an engagement at one of the minor

London theatres. When not yet thirteen years of age, he managed to please his country audiences as Hamlet, Cato, &c., and in Windsor he gained the applause of the royal family in Richard III. He married Mary Chambers, an actress in his company, in 1808.

In 1814 he appeared at Drury Lane first as Shylock and then as Richard III. His success was sudden and unexampled, and was equally great in other parts, including Othello, Hamlet, Macbeth, Iago, Lear, &c. Coleridge said of Kean that "seeing him act was like reading Shakespeare by flashes of lightning," and he was highly praised by Hazlitt and Lamb.—BIBLIOGRAPHY: F. Phippen, *Authentic Memoirs of Edmund Kean*; F. W. Hawkins, *The Life of Edmund Kean*; J. F. Molloy, *The Life and Adventures of Edmund Kean, Tragedian.*

KEATS, John, English poet, was born on 29th or 31st Oct., 1795, and died on 23rd Feb., 1821. His father, Thomas Keats, had married the daughter of his employer, John Jennings, and had taken over his father-in-law's business, a livery

Edmund Kean

stable at the sign of the Swan and Hoop, Moorfields. Keats attended a school at Enfield which was kept by John Clarke, and when there became friendly with his headmaster's son, Charles Cowden Clarke, the Shakespearean scholar, who was an usher at the school, and who encouraged Keats's literary tastes. Keats was a lively and pugnacious boy, but during his last year at school he read all kinds of books with the utmost ardour.

He left school in 1810, and was apprenticed to a surgeon named Hammond at Edmonton. In 1814 he cancelled his indentures and went to London, where he studied at Guy's

John Keats

and St. Thomas's Hospitals. He worked hard at medicine, as some of his notebooks testify, but his chief interest was in poetry. Spenser's *Faerie Queene* was what first inspired him to write. In 1816 he became a dresser at Guy's, and made the acquaintance of Leigh Hunt, who was eleven years his senior, and who exercised a great influence over his development. About the same time he met Haydon, the artist, and Shelley.

Works. He published his first book in the spring of 1817 under the title of *Poems by John Keats.* This book is full of immaturity, but it contains some good work, and the promise of much better. The sonnet *On first looking into Chapman's Homer* is there; but so is much sham Spenserian and florid writing. It was not received with any enthusiasm, and Keats withdrew from London to the Isle of Wight, in order to get the quietness necessary for composition. In May, 1818, appeared *Endymion: a Poetic Romance.* It was not greatly noticed on its first appearance; but is, as Hunt called it, "a wilderness of sweets." Its faults are those of exuberance rather than those of aridity.

In June, 1818, Keats went on a walking-tour in Scotland, but the exertion was too much for his health, and he was ordered by a doctor at Inverness to return home. Two notorious attacks were made upon the poetry of Keats, one in *Black-*

wood's Magazine (Aug., 1818) almost certainly by J. G. Lockhart, and one in *The Quarterly Review* (Sept., 1818) by J. W. Croker. Offensive and ignorant as these articles are, they are by no means exceptional, but are typical of the rancorous criticism of those days. Their bitterness is partly due to party feeling, for Keats and some of his friends, especially Hunt, were Liberals, and Croker and Lockhart were uncompromising Tories.

Tom Keats, the younger brother of the poet, died in Dec., 1818, and Keats went to live with his friend Brown. He had fallen passionately in love with a very ordinary girl named Fanny Brawne, who allowed herself to become engaged to him, but who did not bestow much sympathy or understanding upon the supersensitive poet. In 1819 Keats, although his health was beginning to suffer, was producing some of his best work. By Feb., 1820, he was fatally ill. His third and last book, *Lamia, Isabella, The Eve of St. Agnes, and other Poems*, appeared in July, 1820. This book contains all his best work. All the poems included in it were written between March, 1818, and Oct., 1819. *Isabella* is a beautifully retold tale of Boccaccio. *Hyperion* is a majestic and Miltonic poem, which marks a great advance upon *Endymion*. *Lamia* is a beautiful poem modelled upon Dryden, but no close imitation. The unrivalled series of odes *To Autumn, On a Grecian Urn, To a Nightingale*, and the others, are perhaps the greatest of all the poems of Keats.

His work now won some recognition, notably a laudatory article by Jeffrey in *The Edinburgh Review*. His health, however, speedily declined, and consumption strengthened its grip upon him. He had attacks of hæmorrhage in June, 1820, and in September, accompanied by his friend Severn, he left for Italy. He stayed about a fortnight in Naples, and then went to Rome, where he steadily became worse. He himself spoke of his last weeks as "his posthumous life," and when the end came in Feb., 1821, it was a release. He was buried in the old Protestant cemetery near the pyramid of Gaius Cestius.

Appreciation. For some years after his death a mistaken view of Keats's character prevailed. It was finally dispelled by the publication in 1848 of Lord Houghton's *Life, Letters, and Literary Remains of John Keats*, but it still lingers in certain manuals of literature, and in the minds of ill-informed persons. He was thought to be a mawkish and effeminate man, who permitted himself to be 'snuffed out by an article.' This idea was partly due to the *Adonais* of Shelley, which is a great and noble poem, but which betrays an imperfect understanding of Keats. It is also due to the quotable nature of the clever but callous lines in the eleventh canto of Byron's *Don Juan*. Nothing could be farther from the truth than this idea of Keats. He was eminently manly and level-headed, although in his last days, when his health broke down, he not unnaturally showed signs of a certain morbidity of temperament.

Keats, "the young Marcellus of our tongue," stands among the greatest of English poets, not merely in promise but in performance. He drew his inspiration from some of the best of his predecessors, Spenser, Milton, and Dryden, and his influence has been profound upon the best of his successors, Tennyson, Swinburne, and Morris. He has always been a poets' poet, but he is also loved by all true lovers of romantic poetry.—BIBLIOGRAPHY: R. Monckton Milnes (Lord Houghton), *Life, Letters, and Literary Remains of John Keats*; Sir Sidney Colvin, *Keats* (English Men of Letters Series); W. H. Hudson, *Keats and his Poetry*; J. C. Williamson (editor), *The John Keats Memorial Volume*; Lucien Wolff, *John Keats: sa vie et son œuvre*.

KE'BLE, John, an English divine and poet, born 1792, died 1866. As a zealous High-Churchman he was associated with Newman and Pusey in getting up the famous *Tracts for the Times* (1833). His reputation is chiefly due to his well-known volume of hymns, *The Christian Year*. He also wrote *Lyra Innocentium*, a series of poems on children, and sermons.

KEBLE COLLEGE, one of the colleges of Oxford University, built by subscription as a memorial to John Keble, and incorporated in 1870 by royal charter. The charter declares it to be "founded and constituted with the especial object and intent of providing persons desirous of academical education, and willing to live economically, with a college wherein sober living and high culture of the mind may be combined with Christian training, based upon the principles of the Church of England." The college is a flourishing institution, and has the patronage of about a dozen livings.

KÉCSKEMET (kech'ke-met), one of the largest market towns of Hungary. It has an extensive trade in horses and cattle, and much-frequented fairs. Pop. (1930), 79,467.

KEDAH, one of the Unfederated Malay States, on the west of the Malay Peninsula; area, 3,648 sq. miles; pop. (1931), 429,645. The capital is Alor Star. *See* MALAYA

KEDLESTON, village of Derbyshire. It is situated 4 miles from Derby, and is notable for its connection with the Curzon family, who have lived here since the 11th century. Kedleston Hall, the seat of Viscount Scarsdale, is a fine mansion in the classic style designed by Robert Adam.

KEEL (Dan. *kjöl*; Sw. *köl*), bottom plates or timbering, running fore and aft, and forming a base upon which the skeleton of a ship is built up, and which is the 'backbone' of the completed vessel. Modern liners are usually equipped with *bilge keels* to reduce rolling, and *false keels* or *double keels* as a safeguard against foundering.

KEELHAULING, a punishment formerly awarded for serious offences in the British and other navies. The delinquent was hung up to the yard-arm, dropped over the side of the ship, and hauled from one side of the vessel to the other, passing underneath the keel.

KEELING ISLANDS, or **COCOS ISLANDS,** a group of coral atolls, Indian Ocean, discovered by Captain Keeling (1609), and acquired by Britain from the Dutch in 1856. They have formed a dependency of the Straits Settlements since 1885. The climate is temperate and healthy, but the group is in the cyclone area. Coco-nuts and coco-nut oil are the chief products, but pigs and poultry are reared, and the lagoon formed by the atolls abounds in fish. There is a wireless station. On 9th Nov., 1914, the German cruiser *Emden* attacked the Cocos group, and was destroyed there by H.M.A.S. *Sydney*. Pop. (1931), 1,142.

KEELUNG. *See* KELUNG.

KEENE, Charles Samuel, black-and-white artist, was born at Hornsey in 1823, died at Hammersmith in 1891. After a year or two in a solicitor's office, at the age of nineteen he was apprenticed to Messrs. Whymper, wood-engravers. Five years later he began work for *The Illustrated London News* and other papers, and in 1851 he first appeared in the pages of *Punch*, in 1860 being taken on the staff. From this time till within a few months of his death he contributed continuously to that famous periodical. He was also a regular contributor to *Once a Week*, and illustrated a few books, including Thackeray's *Roundabout Papers*. Keene's work, with subjects taken mostly from the humbler walks of life, is marked by fine and expressive draughtsmanship and great powers of characterization.

KEEWATIN, one of the three districts into which the North-West Territories of Canada are divided, the other two being Franklin and Mackenzie. Keewatin stretches from about long. 102° east to Hudson Bay. Area 228,160 sq. miles.

KEEWATIN, a summer resort on Lake of the Woods, Ontario, Canada. Pop. 2,000.

KEIGHLEY (kēth'lĭ), a municipal borough of the West Riding of Yorkshire, England, with manufactures of woollen and worsted goods, worsted-spinning machinery, machine-tool works, iron-foundries, and sewing-machine works. Keighley 'adopted' (in 1921) the town of Poix-du-Nord, in France, damaged during the European War. Pop. (1931), 40,440.

Charles Keene

KEIJO-FU. *See* SEOUL.

KEI RIVER, GREAT, in South-East Africa, formerly the boundary between British Kaffraria and Kaffraria proper, rises, with its branches the Black and White Kei, in the Stormbergen Mountains, and flows into the Indian Ocean.

KEITH (kēth), a distinguished Scottish family, to which belonged the hereditary office of Grand-Marischal of the kingdom. The first Earl-Marischal was William Keith, created earl in 1458. A successor of his, the fifth Earl-Marischal, founded and endowed Marischal College and University, Aberdeen. The family had at one time great estates, their head-quarters being in Aberdeenshire and Kincardineshire, in which latter

county Dunnottar Castle was their seat.

The most celebrated of the Keiths was James, field-marshal under Frederick the Great, son of William Keith, ninth Earl-Marischal, born 1696, died on the battlefield of Hochkirch, 1758. His brotner George, tenth Earl-Marischal (born 1685, died 1778), was forced to leave Scotland for his share in the Jacobite rising. He afterwards joined his brother James in Berlin, and also gained the favour of the king, to whom he made himself highly useful as a diplomatist. —BIBLIOGRAPHY: P. Buchan, *An Account of the Ancient and Noble Family of Keith*; B. Taylor, *The Great Historic Families of Scotland*; Sir Robert Douglas, *Peerage of Scotland*.

KEITH, Sir Arthur, Scottish scientist. Born at Aberdeen, 5th Feb., 1866, he was educated at the university there and later in London and Leipzig. He became a doctor, and from 1899 to 1902 was Secretary of the Anatomical Society. He was then made conservator of the Museum, and Hunterian Professor at the Royal College of Surgeons, London. In 1921 he was knighted, and in 1927 became President of the British Association. He has been F.R.S. since 1913, and from 1917-22 was Fullerian Professor at the Royal Institution. He became Rector of Aberdeen University in 1930.

Keith made himself a leading authority on anthropology, on which subject he wrote and lectured a great deal. His books include *The Human Body*, *The Antiquity of Man*, *Engines of the Human Body*, *The Religion of a Darwinian*, and *New Discoveries relating to the Antiquity of Man* (1931).

KEKULE', Friedrich August, German chemist, was born at Darmstadt in 1829. He was professor at Ghent and afterwards at Bonn, where he died in 1896. His discoveries of the quadrivalence of carbon, and of the ring distribution of the six carbon atoms in the molecule of benzene, have had a profound influence on the development of organic chemistry and its practical applications.

KELAN'TAN, one of the Unfederated Malay States, on the east coast of the Malay Peninsula; area, 5,713 square miles; pop. (1931), 362,517. It is traversed by the Kelantan River, at the mouth of which is Kota Bharu, the capital.

KELAT, or KALAT, one of the states of the Baluchistan Agency, India, important because of its position with regard to Afghanistan; area, 73,278 sq. miles; pop. 328, 281. The ruler bears the title of *Khan*.

KELAT, KALAT, or KHELAT, a town of Baluchistan, capital of the territories of the Khan of Kelat, occupies the side of a hill at a height of nearly 7,000 feet above the sea. It is surrounded by a mud wall flanked with bastions, and the streets are narrow and filthy. Manufactures include small arms and swords. Pop. estimated at 15,000.

KELHAM, village of Nottinghamshire. It is on the Trent, 2 miles from Newark. Here is a factory for dealing with sugar beet which is grown in the neighbourhood. The fine hall is a tneological college of the Church of England. Pop. 400.

KELLER, Helen Adams, American blind and deaf mute. Born 27th June, 1880, she lost the senses of sight, hearing and smell when 19 months old. Anna Sullivan of the Perkins Institute of the blind taught her to read by the deaf and dumb alphabet, also writing and typewriting. In 1890 she learned to speak. She graduated with honours at Radcliffe College, Cambridge, Mass., and wrote several books including *The Story of My Life*, 1903, and *The World I Live In*, 1908. In 1932 she visited Scotland to receive honorary degrees at the universities.

KELLERMANN, François Christophe, Duc de Valmy, Marshal and peer of France, born 1735, died 1820. He joined the army as a volunteer in 1752, distinguished himself during the Seven Years' War, and rose rapidly to the command of an army corps. At the commencement of the revolutionary war he received the command of the army of the Moselle, formed a junction with Dumouriez, and sustained the 'cannonade of Valmy,' which caused the allies to retreat.

In the following wars Kellermann received various commands, and Napoleon loaded him with honours. After the restoration of the Bourbons he was appointed a member of the Chamber of Peers. His son, François Étienne Kellermann, second duke, born 1770, died 1835, also distinguished himself in the Napoleonic wars, in Italy, in the Peninsula in the campaign of 1813, at Ligny, and at Waterloo.

KELLOGG, Frank Billings, American diplomat and lawyer. Born at Potsdam, New York, 22nd Dec., 1856, he was educated in Minnesota, and admitted to the Bar in 1877. He practised in Rochester and St. Paul, and was special counsel in the action to dissolve the Union Pacific and Southern Pacific railway merger. Elected to the Senate, 1917–23, in 1924 he became American ambassador in London, resigning in 1925 to become

Secretary of State in President Coolidge's Government, until 1929. Here he won fame as the originator of the **Kellogg Pact**, or Pact of Paris, signed in 1928, a multilateral treaty for the outlawry of war as an instrument of national policy. He was awarded the Nobel Peace Prize for 1929, and has been Judge of the Permanent Court of International Justice, The Hague, since 1930.

KELLS (originally **KENLIS**), a market town of Ireland, County Meath, picturesquely situated on a small hill near the Blackwater. It is a very ancient town with a round tower, and was formerly a place of much ecclesiastical importance. Pop. (1926), 2,198.

KELLY, Edward (known as Ned), Australian bushranger, born in Australia (1854), was the eldest son of a deported Belfast convict. At an early age he was sentenced to three years' imprisonment for horse-stealing. In 1878 an attempt was made to arrest Dan Kelly, Ned's brother, on a similar charge, but the family offered an effective resistance by which the two brothers were enabled to escape into the bush. Here they joined two men, named Byrne and Hart respectively, and the gang terrorized Victoria and New South Wales for two years, burning banks and pillaging towns. They were very gallant towards women, and the fact that they never robbed the poor and were reputed to maintain an excellent system of espionage explains their long immunity from arrest. Eventually the gang were rounded up in an 'hotel' near Benalla. Ned Kelly could have escaped, but he refused to desert his companions, was seriously wounded, captured, tried, convicted, and hanged in Oct., 1880.—Cf. F A. Hare, *The Last of the Bushrangers*.

KELP, the ash produced by burning certain seaweeds, especially the large Laminarias; it contains soda, potash, and iodides among other salts. Kelp-burning was at one time a regular and lucrative industry in the Hebrides and elsewhere, but was practically destroyed by the competition of cheaper imported chemicals. During the European War it was revived, and, if developed along more scientific lines than those formerly in vogue, may once more become of considerable importance. The name is also applied to the seaweeds themselves (Laminariaceæ).

KELSO, a Scottish town and police burgh of Roxburghshire. In the outskirts of the town are the magnificent ruins of Kelso Abbey, founded and endowed by David I in 1128. It is in the form of a Latin cross, and is a fine specimen of the Norman style of architecture. In the immediate vicinity is Floors Castle, the seat of the ducal family of Roxburghe. Pop. (1931), 3,855.

KELTY, town of Fifeshire. It is 8 miles from Dunfermline, on the L.N.E. Rly. It owes its existence to the opening of the coal mines in the 19th century. Pop. 7,400.

The River Kelty is a tributary of the Forth, and runs for some distance between Perthshire and Stirlingshire.

KELUNG', or **KEELUNG**, a town and seaport in the northern part of the Island of Formosa, opened to foreign commerce in 1863. Coalfields are worked near it, and

Kelso Abbey

quantities of coal are exported. There is also an extensive export trade in rice, sugar, and camphor. Pop. 17,000.

KELVIN, William Thomson, Baron, mathematician, physicist, and inventor, was born at Belfast in 1824, his father being James Thomson, who afterwards became professor of mathematics in Glasgow University. After taking the Glasgow arts course he entered Peterhouse, Cambridge, and graduated in 1845 as Second Wrangler and first Smith's prizeman. He began original work at an early age, and published several papers in the *Cambridge and Dublin Mathematical Journal* while still in his teens.

In 1846 he was appointed to the chair of natural philosophy in Glasgow University, a post which he held till 1899. After the final successful laying of the Atlantic cable in 1866, an achievement largely due to Thomson's theoretical and practical skill, he was knighted. In 1892 he was raised to the peerage as Baron Kelvin of Largs. For a great part of his life Kelvin was universally regarded as

the leading scientist of his time. He was president of the British Association in 1871, and of the Royal Society from 1890 to 1895. The celebration of the jubilee of his professorship in 1896 was attended by nearly every eminent living scientist. He died in 1907, and was buried in Westminster Abbey.

Kelvin's theoretical work ranged over all physics, and he made important advances in thermodynamics, heat, electricity and magnetism, elasticity, and hydrodynamics. But he is best known, perhaps, for his practical inventions, which included electrical measuring instruments of all kinds (e.g. the mirror galvanometer and the quadrant electrometer), a machine for taking flying deep-sea soundings, a tide predictor, and an improved form of the mariner's compass. Thomson and Tait's *Natural Philosophy*, written in collaboration with Professor P. G. Tait, is still a standard treatise on dynamics. Kelvin's collected mathematical and physical papers have been published in five volumes; the papers on electrostatics and magnetism appeared separately in 1874.—Cf. Silvanus P. Thompson, *Life of William Thomson, Baron Kelvin of Largs*.

KEMAL, Pasha Ghazi Mustapha, Turkish politician. Born in 1882 at Salonika, he became a soldier. In 1915 he commanded the Turkish armies on the Gallipoli peninsula and afterwards made himself a very formidable figure in public affairs. At the head of a group of nationalists he set up a government at Angora which, in 1922, was strong enough to abolish the office of sultan. At the head of affairs, Mustapha Kemal won a signal diplomatic victory when the Treaty of Lausanne, in 1923, restored to Turkey much of the territory she had lost. In the same year Kemal was chosen president of the republic, which, under his strong rule, made great progress. He was still president in 1933.

KEMBLE, Charles, English actor, born 1775, died 1854, the youngest son of Roger Kemble, and brother of John Philip Kemble. He was educated at Douai (France), returned to England in 1792, obtained a situation in the post office, but relinquished it in favour of the stage in 1794, when he made his first appearance at Drury Lane. His success was largely due to his representations of such characters as Edgar, Romeo, Charles Surface, Antony, Mercutio, Macduff, &c., and to his fine voice, handsome face, and figure. Macready said of him that he was "a first-rate actor in second-rate parts."

He was appointed censor of plays in 1840, when he retired from the stage, and only gave occasional Shakespearean readings. He had married the favourite actress Miss Marie de Camp in 1806, by whom he was the father of John Mitchell Kemble, Frances Anne Kemble, and Adelaide Kemble.

KEMBLE, Frances Anne, popularly known as Fanny Kemble, writer and actress, eldest daughter of Charles Kemble, and niece of Mrs. Siddons, was born at London 1809, and died in 1893. She first appeared on the stage at Covent Garden as Juliet, in 1829. Among her writings are the tragedy *Francis I* (in which she herself acted the part of Louis of Savoy), *Journal of a Residence in the United States*, *Journal of a Residence on a Georgia Plantation*, *Records of a Girlhood*, *Records of Later Life*, and her *Notes on Some of Shakespeare's Plays*. As an actress she excelled in the characters of Portia, Beatrice, Lady Macbeth, Lady Teazle, and of Julia in Sheridan Knowles's *The Hunchback*. —Her younger sister Adelaide, born 1820, greatly distinguished herself on the operatic stage, but retired on her marriage in 1843.

KEMBLE, John Mitchell, an eminent Old-English scholar, son of Charles Kemble, born 1807, died 1857. He graduated at Cambridge, and, having taken up the study of Old-English, spent a considerable time in studying the ancient MSS. in the libraries there. He edited *Beowulf* (1833) and other Old-English works, including an incomplete edition of the Old-English Gospels, and a collection of all the known charters of the Old-English period, under the title of *Codex Diplomaticus Ævi Saxonici*. Perhaps his most valuable work (only complete so far) is the *Saxons in England* (London, 1849, 2 vols.). For a number of years he edited *The British and Foreign Review*, and from 1840 until his death he acted as censor of plays.

KEMBLE, John Philip, actor, eldest son of Roger Kemble (theatrical manager), born at Preston 1757, died at Lausanne 1823. He was sent to the Roman Catholic college of Douai (France), where he distinguished himself by his fine elocution; but, in spite of his parents' opposition, he selected the stage as a profession, made his first appearance at Drury Lane in 1783, and at once became popular. He was manager of this theatre from 1788 to 1802.

From 1801 to 1803 he successfully toured France and Spain, and on his return to London he purchased a share in the Covent Garden Theatre,

and made himself a splendid reputation in the characters of Julius Cæsar, Hamlet, Macbeth, and Coriolanus. His theatre having been burned down, he opened the new edifice in 1809 with an increase of prices, which, together with certain other unpopular arrangements, created for a series of nights the notable disturbances known by the name of the *O.P.* (*old price*) *Riots*. He abandoned the stage in 1817. His statue was placed in Westminster Abbey in 1833. His acting was distinguished for dignity, precision, and studious preparation, but was wanting in fire and pathos. His sister Sarah was the celebrated Mrs. Siddons.—Cf. P. H. Fitzgerald, *The Kembles: an Account of the Kemble Family*.

KEMPIS, Thomas à. *See* THOMAS À KEMPIS.

KEMPSTON, urban district of Bedfordshire. It is on the Ouse, 3 miles from Bedford. Roman and Saxon remains have been discovered here. Pop. (1931), 5,390.

KEMP'TEN, a Bavarian town on the Iller, 81 miles S.W. of Munich. There is a seventh-century abbey church and an old town hall. It has large cotton-mills, woollen- and linen-factories, and much-frequented fairs. Pop. 21,874.

KEMPTON PARK, district of Middlesex. It is near Sunbury, and is known for its racecourse. In the Middle Ages there was a palace here from which Henry VIII used to hunt.

KEMP-WELCH, Lucy Elizabeth, English artist. Born at Bournemouth in 1869, she studied at the Herkomer School of Art, Bushey, Herts, and first exhibited at the Royal Academy in 1894.

Her paintings of animals, especially of horses, show fine draughtsmanship, a strong sense of colour and good composition. Among her best works are "Colt Hunting in the New Forest" in the Tate Gallery, London; "Summer Drought"; "Horses Bathing in the Sea"; "Lord Dundonald's Dash on Ladysmith"; and "The Harvesters."

KEMSING, village of Kent. It is 3 miles from Sevenoaks with a station on the S. Rly. It is notable as the birthplace of S. Edith. An image of the saint which stood in the churchyard was visited by thousands who believed it had miraculous power.

KEN, Thomas, English prelate, born 1637, died 1711. After studying at Oxford he became successively chaplain to the Princess of Orange, to the Earl of Dartmouth, and in 1684 to Charles II, who made him Bishop of Bath and Wells. In 1688 he was sent to the Tower for resisting the dispensing power claimed by James II, and yet some months later he refused to take the oath of allegiance to William of Orange, and was dispossessed of his see; but Queen Anne granted him a pension. His sermons and moral treatises have long been forgotten, but his Morning and Evening Hymns are still in use.—Cf. E. H. Plumptre, *Life and Letters of Bishop Ken*.

KENCHESTER, village of Herefordshire, It is 5 miles from Hereford and is chiefly remarkable as the site of the Roman town of Castra Magna. Much of it was excavated, 1912–13; and many interesting relics were found. Pop. 100.

KENDAL, a municipal borough, county Westmorland, England, situated on the Kent. Amongst its manufactures are serges, carpets, tweeds, knitted goods, and fish-hooks. Pop. (1931), 15,575.

KENDAL, Dame Margaret, English actress. Born at Cleethorpes, 15th March, 1849, she first appeared in London in 1865, under her maiden name of Margaret (Madge) Robertson. She won her greatest successes in emotional parts. In 1869 she married the actor W. H. Grimston (1843–1917), who took the name of Kendal. With Sir John Hare he was manager of the St. James's Theatre, 1879–88. Mrs. Kendal retired in 1907 and in 1926 was made a Dame (D.B.E.).

KEN'ILWORTH, a town of Warwickshire, England. Kenilworth Castle, now a magnificent ivy-covered ruin, was founded in the reign of Henry I. The gorgeous entertainment given there in 1575 to Queen Elizabeth by the Earl of Leicester is familiar to all from Scott's romance of *Kenilworth*. Pop. (1931), 7,592.

KENLEY, district of Surrey. It is 17 miles from London, on the S. Rly. The fine common is the property of the city corporation.

KENMARE, market town of Kerry, Irish Free State. It stands on the river of the same name and is reached by the G.S. Rly., and by canal. It is a popular tourist centre, the attractions including fishing and some wonderful scenery. Near are Dorreen, a seat of the Marquess of Lansdowne, and Dunkerran Castle. Pop. 1,034.

Kenmare River, really an estuary, 28 miles long and reaching 6 miles wide, separates the counties of Cork and Kerry.

The Irish title of the **Earl of Kenmare** has been borne since 1801 by the family of Browne. The earl's eldest son is called Viscount Castle-

rosse. The son of the 5th earl, Viscount Castlerosse, made a reputation as a journalist on *The Daily Express*.

KENNEDY, Benjamin Hall, English classical scholar and schoolmaster, was born in 1804, died in 1889. He was educated at Shrewsbury under Dr. Butler, and at St. John's College, Cambridge. Both at school and university he had a brilliant career, graduating in 1827 as senior classic, senior optime, and first chancellor's medallist. In 1836 he was appointed headmaster of Shrewsbury in succession to Dr. Butler, and here he remained for thirty years, turning out a remarkable number of brilliant scholars; among them H. A. J. Munro and J. E. B. Mayor. In 1867 he was appointed regius professor of Greek at Cambridge, and Canon of Ely, and held these offices till his death. Among his works are: *The Public School Latin Primer*; *The Public School Latin Grammar*; and *Between Whiles, or Wayside Amusements of a Working Life*.

KENNEDY, Margaret, English novelist. A daughter of C. M. Kennedy, a barrister, she went to Cheltenham College and then to Somerville College, Oxford. She studied history, and in 1922 published *A Century of Revolutions*. In 1924 she made a name with a novel, *The Constant Nymph*, which was equally successful on the stage and screen. Her later books include *Red Sky at Morning, Come with Me, Return I Dare Not* (1931), and *A Long Time Ago* (1933). She is the wife of Mr. David Davies.

KENNEDY, Thomas, Scottish politician. Born in 1876, he became a Socialist and in time was appointed Secretary of the Social Democratic Federation. In 1921 he was elected M.P. for Kirkcaldy and he was re-elected in 1923, 1924 and 1929. In 1921 he was made one of the whips of the Labour Party in Parliament, and in 1924 was a Lord of the Treasury. In 1927 he became chief whip and in 1929 Parliamentary Secretary to the Treasury. In Aug., 1931, he resigned, and at the general election lost his seat. He was made a Privy Councillor in 1931.

KENNEH, or **QENA,** a town of Upper Egypt, on the right bank of the Nile, well known for its pottery manufacture, and carrying on a considerable trade with Arabia and India by way of Kosseir. Pop. 27,658.

KENNINGTON, a parliamentary division of Lambeth, London. It contains Kennington Oval, the famous Surrey County cricket ground, and Kennington Park, the scene of the Chartist assembly (1848). Kennington Park once known as Kennington Common, was extended in 1931.

KENNINGTON, Eric Henri, English artist. Born in London, 12th March, 1888, he studied art there. His first important work, "The Costermongers," was exhibited in 1914. It is now in the Luxembourg, Paris. In 1918 he was appointed an official artist on the western front. His works include a painting on glass, "The Kensingtons in Action," war memorials in Battersea Park, London, and Soissons, and the bronze statue of Thomas Hardy unveiled at Dorchester in 1931.

KENŌSIS (Gr., literally an emptying), a Christological doctrine, which lays stress on the human development of Christ. The Logos, in the act of incarnation, laid aside, or emptied Himself of, His divine attributes and also His divine self-consciousness, which He gradually regained in the course of His earthly life, having done so completely by the time of the Ascension. The doctrine takes its name from a passage in *Phil.* ii, 7, translated in the ordinary version, "made himself of no reputation," in the revised version, more literally, "emptied himself." The doctrine has been the subject of considerable controversy, and the great objection to it lies in the unchangeability of God.—Cf. W. Sanday, *Christologies, Ancient and Modern*.

KENSAL GREEN, a suburb in the north-west of London, with a cemetery which was the burying-place of many famous people, including Thackeray, Leigh Hunt, John Leech, Thomas Hood, Robert Owen, and Anthony Trollope. It covers 70 acres.

KEN'SINGTON, a municipal and parliamentary borough and western suburb of London. Kensington Palace, the birth-place of Queen Victoria; Kensington Gardens, 350 acres; Horticultural Society's Gardens; Albert Memorial; Royal Albert Hall; Victoria and Albert Museum; Indian Museum; British Museum of Natural History; and the University of London (the Imperial Institute being in the same building), are all in Kensington. Pop. (1931), 180,681.—Cf. W. J. Loftie, *Kensington, Picturesque and Historical*.

KENSINGTON (SOUTH) MUSEUM, or **VICTORIA AND ALBERT MUSEUM,** a museum in London, originated by Prince Albert, and first opened in 1857, receiving the second name above in 1899 when the foundation stone of new buildings was laid by the queen. It contains probably the most beautiful and generally in-

teresting collection in Europe, comprising objects of industrial art, both ancient and modern, products and materials used in manufactures, building, engineering, &c.; reproductions of ancient sculpture and architecture, modern paintings in oil and water-colour, and sculpture by British artists, besides occasional loan collections. It is under the direction of the Board of Education and receives large Government grants. It forms the centre of industrial art education in Great Britain, and schools of science and cookery are also connected with it.

KENT, William, English landscape-gardener, architect, and painter, was born 1685, died 1748. He was apprenticed to a coach-painter, but repaired to London, tried his hand at portrait and historical painting, and with the assistance of some of his patrons was enabled to study for some years in Italy. On his return he carried out some architectural work, notably the *Horse Guards* in Whitehall, but he is best known as the founder of modern landscape-gardening.

KENT, maritime county of England, forming the south-eastern extremity of the kingdom; area, 975,965 acres. The county is of great historical interest. Cæsar made his first landing near Dover, and many Roman camps and relics of the colony which he founded are to be found on either side of the ancient Roman roadway, *Watling Street*, which traverses the present county from Dover to London. Hengist and Horsa invaded Kent (Thanet) about A.D. 455, and established an Anglo-Saxon kingdom which, having Canterbury (q.v.) as its capital, eventually became one of the most important of the Anglo-Saxon heptarchy. It was in Thanet, also, that St. Augustine landed with his monks on their mission to convert Britain to Christianity.

The modern county is the home of picturesque English rural scenery, and Kent has well been called the 'Garden of England.' Many celebrated watering-places encircle its shores, and Dover is one of the most important ports of communication with France, from which a cross-channel tunnel has been frequently advocated as a means of firmly cementing the British *entente* with France. There are magnificent cathedrals at Canterbury and at Rochester, and mediæval castles and mansions are to be found in several towns.

Hops are cultivated, and there are many dairy-farms and market-gardens. There is a certain amount of coastal fishing, but the oyster 'natives' of Whitstable are of more importance. Gunpowder is manufactured, and there are great paper mills at Gravesend. Chatham is famous for its extensive Admiralty dockyards and colossal naval barracks; but it is also a military centre, although secondary to Aldershot in this respect. In sport, Kent is best known as a cricketing county. Its literary associations are inseparable from Chaucer, whose *Canterbury Tales* are related wholly in Kent. Dickens drew upon Kentish scenery for description in *David Copperfield*, and Thackeray, Barham (*Ingoldsby Legends*), and many others have found inspiration from Kent and Kentish places. The county town is Maidstone. Pop.(1931), 1,219,273.—BIBLIOGRAPHY: R. J. King, *A Handbook for Travellers in Kent and Sussex*; J. Hutchinson, *Men of Kent and Kentish Men*; W. Jerrold, *Highways and Byways in Kent*.

KENTIGERN, Scottish saint. He was born in 518 and was educated at Culross by Saint Servanus. A period of hermitage preceded his elevation to the rank of Bishop of Glasgow. He remained there until his death in 603, except for a few years passed in Wales. Sometimes called Mungo, or the beloved, Kentigern is the Patron Saint of Glasgow.

KENTISH TOWN, district of London. To the north-west of the city in the borough of St. Pancras, it is a densely-populated district. The industries include the making of cigarettes, furniture, &c. Here is the North-Western Polytechnic.

KENT'S HOLE, a cavern near Torquay, Devonshire, England, in which have been found many bone implements of Palæolithic type. It was first examined in 1825 by J. M'Enery, and afterwards explored by M. Godwin Austen in 1840, and by W. Pengelly (1864-80). *See* CAVE.

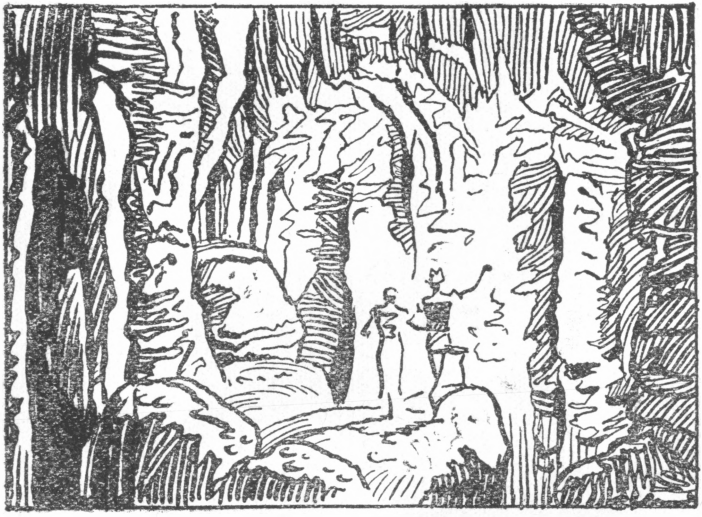
KENTUCK'Y, one of the United States, bounded north by Ohio and Indiana, north-west by Illinois, west by Missouri, south by Tennessee, and east by Virginia and West Virginia; area, 40,598 sq. miles. The surface of the state is gently undulating, excepting the south-east, which is somewhat mountainous. Few states are better provided with water communication. The Ohio forms the boundary on the north, and receives from within the state numerous tributaries, of which the most important are the Cumberland, Kentucky, and Tennessee; the Mississippi, after receiving the Ohio, forms the boundary on the west.

The climate is salubrious, the soil fertile, the principal crops being wheat, Indian corn, and tobacco; but oats, barley, hemp, and fruit are extensively raised, and stock breeding is another important feature, the Ken-

tucky cattle and horses especially being celebrated. The 'blue-grass' region furnishes admirable pasture. Coal and iron ores of various descriptions abound in many parts of the state. Limestone occupies a large area, and in this formation are the Mammoth Cave and others. The chief manufacturing industries comprise cotton- and woollen-factories, ironworks, and tanneries.

The central position of the state, and the abundant water and railway communication, have secured it a rapid commercial development. Kentucky originally formed part of

now public property. Sometimes called Caen Wood, a house stood here in the 17th century or earlier. This became the property of the Duke of Argyll and later of the Earl of Bute. In 1755 the 1st Earl of Manfield bought it and the house was largely rebuilt for him by Robert Adam. It remained a seat of the earls for about 150 years. In the 20th century it was bought by the Earl of Iveagh, who, in 1927, left to the nation the house and some 70 acres of land. The wood proper, previously acquired, was opened in 1925 as a public pleasure ground.



Great Caves of Kentucky

Virginia, but was separated from it in 1789, and admitted into the Union 4th Feb., 1791. The seat of government is Frankfort, a comparatively small place; the oldest town is Lexington; but the largest and most important is Louisville. Pop. (1930), 2,614,589.—BIBLIOGRAPHY: E. P. Johnson, *History of Kentucky and Kentuckians*; R. M. M'Elroy, *Kentucky in the Nation's History*.

KENTUCKY RIVER, a river of the United States, rises in the Cumberland Mountains, traverses the state of Kentucky, and after a course of 250 miles flows into the Ohio at Carrollton. By a series of improvements the lower portion has been rendered navigable by steamers.

KEN WOOD, estate at Hampstead,

KENWORTHY, Joseph Montague, English politician. Born 7th March, 1886, the eldest son of Baron Strabolgi, he entered the navy in 1902. Having served through the Great War, he retired in 1920 with the rank of lieutenant-commander. In 1919 he had been elected Liberal M.P. for Hull (Central) and in 1926 he joined the Labour Party, losing his seat in 1931. In the House of Commons he became a pertinacious questioner of ministers. At one time Kenworthy was heavyweight boxing champion of the navy.

KENYA, a mountain of Kenya Colony, in Kenya province, 100 miles north of Nairobi. It is 17,044 feet in height, perpetually snow-capped, and has many glaciers. The peak is the denuded core of a volcano.

KENYA COLONY AND PROTECTORATE (formerly **BRITISH EAST AFRICA PROTECTORATE**), British territories in East Africa bounded by Abyssinia, Italian Somaliland, the Indian Ocean, Tanganyika, and Uganda; area, 212,000 sq. miles (including native reserves of 20,000,000 acres).

Constitution and Government. The British East Africa Protectorate was proclaimed in 1890, came under the Colonial Office in 1905, and in 1920 was elevated to the position of a Crown Colony, the coastal strip belonging to and leased from the Sultan of Zanzibar remaining, however, Kenya Protectorate (area, 2,200 sq. miles). In 1925 part of Jubaland (area, 33,000 sq. miles, pop. 12,000) was ceded to Italy. (*See* JUBALAND.)

The Constitution (adopted 1925) provides for the representation of Europeans, Indians, and natives on the Legislative and Executive Councils. There are seven provinces, Coast, Ukamba, Kikuyu, Nyanza, Northern Frontier, Kerio, and the Masai, and five extra provincial districts. White-settled areas are under Resident Commissioners and native reserves are controlled by District Commissioners.

Climate, Production, &c. The coastlands are low, rising to hills and a great central plateau, then falling on the west towards Lake Victoria. The climate is good, especially in the highlands where there are many European settlers, but malaria is common. In the low-lying districts rice, coconuts, cotton, sugar-cane, &c., are produced, while in the highlands coffee, maize, wheat, sisal, tobacco, and fruit are the chief products, and cattle and sheep are reared. Forests cover about 3,300 sq. miles and are situated principally on the coast (ebony, copal, mangroves, &c.) and north and west of Nairobi (cedar, camphor, bamboo, &c.). There are several Government saw-mills. Gold, graphite, opals, mica, bitumen, copper, &c., exist but are little worked.

Commerce. The total value of exports in 1931 was £4,322,136, and of imports £5,092,026 (these figues include Uganda, which is in customs union with Kenya). The chief exports from Kenya are coffee, hides and skins, fibre, copra, rubber, wool, and tobacco, and the trade is mainly Empire.

Communications, and Towns. Transport is bad in many places. The Uganda Railway has over 995 miles of track within the colony. There are 3,545 miles of motor roads and hundreds of miles of other roads. Nairobi is the capital, and Mombasa with Kilindini (q.v.) is the largest town and chief port. The harbours are state-owned and are equipped with electric cranes. The wireless station at Nairobi gives communication with Great Britain.

Religion and Education. There are numerous Christian missions at work and doing excellent religious, educational, and medical service in Kenya. There are Government, European, and mission schools.

Currency and Population. Currency is controlled by the East African Currency Board, the standard being the silver shilling (20 = £1) divided into 100 cents. The population was about 3,040,940 in 1931 (including 16,812 Europeans, 39,500 Asiatics, and 12,100 Arabs). For map *see*

Mount Kenya

UGANDA.—BIBLIOGRAPHY: *The Kenya Handbook*; A. S. and G. G. Brown, *Guide to South and East Africa*; N. Leys, *Kenya*; Sir. G. Buchanan, *British East Africa*; F. S. Joelson, *Eastern Africa To-day*.

KE'OKUK, a city of Iowa, United States, at the foot of the lower rapids of the Mississippi. It is an important business centre, and has numerous flour- and saw-mills, foundries, and pork-packing establishments. Settled in 1820, it became a city in 1848. Pop. (1930), 15,106.

KEPLER, Johann, German mathematician and astronomer, born 1571 near Weil (Württemberg), died at Ratisbon 1630. He studied at the University of Tübingen, and in 1593 he was appointed professor of mathematics at Gratz (Styria). Here he devoted himself to the study of astronomy; but in 1599 the religious persecutions commenced in Styria, and Kepler, being a Protestant, gladly accepted Tycho Brahe's invitation to Prague, to assist in the preparation of the new astronomical tables, called the *Rudolphine Tables*. Tycho died in

1601, and Kepler continued the work alone, being appointed Imperial mathematician and astronomer. After twenty-five years' incessant labour the tables were published in 1627 at Ulm. Kepler had become the happy possessor of all Tycho's papers, and the mass of observations made by that astronomer during twenty years, with a precision till then unsurpassed, enabled Kepler to establish his three laws which have proved so fruitful in the development of astronomical science.

Kepler enjoyed the patronage of the Emperors Rodolph and Ferdinand, the Dukes of Württemberg and Wallenstein, but his life was a continued

Johann Kepler

struggle; he was exposed to much religious persecution, and his domestic relations were equally unfortunate. The latter part of his life was chiefly passed at Linz as professor of mathematics.

He wrote much, but the work that has rendered him immortal is his *Astronomia Nova, seu Physica Cœlestis tradita Commentariis de Motibus Stellæ Martis* (New Astronomy, or Celestial Physics delivered in Commentaries on the Motions of Mars; Prague, 1609, folio).—BIBLIOGRAPHY: J. L. C. Breitschwert, *Johann Kepler's Leben und Werken*; Sir D. Brewster, *The Martyrs of Science: Galileo, Tycho Brahe, and Kepler*; Otto Closs, *Kepler und Newton und das Problem der Gravitation*.

Kepler's Laws, in astronomy, three laws discovered by Kepler on which were founded Newton's discoveries, as well as the whole modern theory of the planets. (1) Every planet describes an ellipse, the sun occupying one focus. (2) The radius vector (line joining the centre of the sun to the centre of the planet) of each planet sweeps over equal areas in equal times. (3) The squares of the periodic times (the periods of complete revolution round the sun) of two planets are proportional to the cubes of their mean distances from the sun. These laws enabled Newton to reach the law of gravitation.

KEPPEL, Augustus, a British admiral, born 1725, died 1786, was the second son of the Earl of Albemarle. He entered the navy as a boy, and accompanied Anson round the world (1740–5). He was given command of the Channel fleet in 1778, and in July of that year engaged the French fleet off Ushant. Having become partly disabled, he signalled for his van and rear divisions, but Palliser, in command of the rear, ignored the signal until too late. Palliser accused him of incapacity and cowardice, but Keppel was honourably acquitted, and received the thanks of both Houses of Parliament. In 1782 he was raised to the peerage under the title of Viscount Keppel and Baron Eldon. He was First Lord of the Admiralty in the Cabinets of the Marquess of Rockingham and the Duke of Portland in 1782 and 1783.

KERAK. *See* TRANSJORDAN.

KER'BELA, or **MESHED HUSSEIN,** a town of Iraq (Mesopotamia). It contains the tomb of Hussein, son of the Caliph Ali, and grandson of Mahomet. It is a very ancient city and holy to Mahommedans, especially to the Shiites, who make pilgrimages there in thousands. It is also a starting-point for the pilgrimage to Mecca. Some of the pilgrims carry to Kerbela the bones of relatives for burial there, and the fees exacted form an important revenue. Pop. about 65,000.

KERCH, or **KERTCH** (ancient **PANTICAPÆUM**), a seaport town of U.S.S.R., in the Crimean, on the Strait of Yenikale, which connects the Sea of Azov with the Black Sea. The modern town is of quite recent existence; it is well built, advantageously situated for commerce, and has a considerable trade. Pop. 34,000.

KERENSKY, Alexander Feodorevitsh, Russian barrister-politician, born 1881, of Jewish extraction, joined the Russian Labour party and sat in the Duma as a moderate Socialist. He was a recognized legal defender of political criminals. On the Revolution he was appointed Minister of Justice, and soon became

head of the Government. In conflict with Kornilov (q.v.), who demanded a military dictatorship, he removed him from the High Command, where he had superseded Brusilov, and proclaimed the Russian Republic, with himself as Prime Minister (15th Sept., 1917). On the Trotsky-Lenin coup (8th Nov., 1917) Kerensky left Leningrad, and subsequently appeared in London (June, 1918). In 1919 he published an account of his activities called *The Prelude to Bolshevism*. In 1932 he wrote for the press in London.

KERGUELEN ISLAND (ker'ge-len), or **DESOLATION ISLAND**, an island in the southern limit of the Indian Ocean, discovered by the French navigator Kerguélen in 1772, annexed by France in 1893, but not permanently settled. It is of irregular shape, much cut up by fjords and inlets and surrounded by islets; greatest length, about 100 miles; highest summit, 6,200 feet. The scenery is picturesque and often magnificent; glaciers and snow-fields occupy a considerable area. The climate is wet and stormy, the temperature never very high nor very low.

The fauna and flora are somewhat limited. The former includes the fur seal, sea elephant, and numerous penguins, petrels, and the albatross; the latter is most abundant in the form of mosses and lichens, but the most peculiar form is the Kerguelen cabbage (*Pringlea antiscorbutica*), a perennial cruciferous plant much valued by seamen of whalers and sealers on account of its antiscorbutic properties.

Cook visited the island in 1777, Ross in 1840, the *Challenger* Expedition in 1874, and in 1874–5 parties from Britain, Germany, and the United States were stationed here to observe the transit of Venus.

KERKUK', properly **KIRKUK**, a town of Iraq. There are petroleum and naphtha springs in its neighbourhood, and it has considerable trade. Pop. (chiefly Kurds and Jews), about 31,500.

KERMADEC ISLANDS, since 1840 a British dependency, but formally annexed and attached to New Zealand in Aug., 1887. They consist of two principal islands, surrounded by a number of small islets and rocks. The most northerly and the largest is Raoul, or Sunday Island, 674 miles north-east of Auckland; area, 7,200 acres. They are of volcanic origin, and earthquakes and other disturbances have frequently taken place. The highest peak is 1,723 feet above sea-level. Vegetation is luxurious, the flora being similar to that of Northern New Zealand; fish and birds are plentiful. There is no good harbour.

The first settlers were two Englishmen married to Samoan girls, who landed on Sunday Island in 1837, but quitted it again in 1848. Others have been there since for shorter periods, but the islands are at present uninhabited. The greatest measured depth of the Southern Pacific, 5·8 miles, occurs off Macaulay Island. Total area of islands, 13 sq. miles.

KERMÂN', KIRMÂN', or **SIRGAN**, a town in Persia, capital of a province of the same name. It has numerous mosques, baths, caravanserais, and a well-furnished bazaar. Its manufactures consist of silks, shawls, and woollens. Pop. estimated at 30,000.—The province of **Kerman**, in the south-east of Persia, has an area of 60,000 sq. miles, and a population of about 600,000.

KERMANSHAH', or **KIRMANSHAHÂN'**, a town in Persia, province of Ardilân. The manufactures consist chiefly of carpets; the trade, chiefly transit by the routes from Baghdad, Shuster, and Isfahan, is considerable. During the European War it was occupied by the British in 1918. Pop. about 40,000.

KER'OSENE. *See* PETROLEUM.

KERRIA, a genus of Rosaceous shrubs. The only species, *K. japonica*, is commonly grown in shrubberies or against walls; its flowers are bright yellow and rather showy.

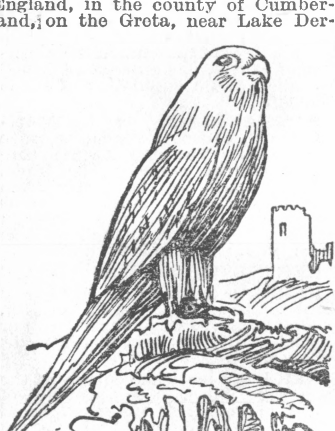
KER'RY, a maritime county of the Irish Free State, in the province of Munster; area, 1,161,708 acres. Great part of it is mountainous, Carran Tual, the highest peak in Ireland, attaining a height of 3,414 feet above sea-level; other parts are very fertile, producing excellent pasture and good crops of oats, barley, and potatoes, but agriculture is much neglected. The climate is mild and moist.

The coast is much indented by bays and inlets (Dingle Bay, Kenmare River, &c.); the interior presents much fine scenery, including the picturesque lakes of Killarney. Iron ore, copper, and lead exist, and a superior kind of slate and flagstone are obtained in great quantities in the Island of Valentia. The chief exports are oats and dairy produce. Principal towns, Tralee, Killarney, and Listowel. Pop. (1926), 149,171.

KESTEVEN (The Parts of Kesteven), a sub-division of Lincolnshire, forming its south-west part, since 1888 an administrative county by itself. The Parts of Kesteven unite with Rutland in returning two members to Parliament. Area, 469,142 acres; Pop. (1931), 110,059.

KESTREL, or **WINDHOVER** (*Tinnunculus alaudarius*), a species of the falcon sub-family, widely distributed in Europe. It is remarkable for its habit of remaining suspended in the air by means of rapid wing motion, being at this time on the look-out for mice, which are its chief food. At times it will also eat small birds, and insects frequently. It varies from 12 to 15 inches in length; it nests in trees, also in old towers and buildings, and often utilizes an old crow's nest. In winter it migrates to North Africa and India.

KESWICK (kes'ik), a town of England, in the county of Cumberland, on the Greta, near Lake Der-



Kestrel

wentwater. Lead pencils and woollens are manufactured, but the inhabitants depend chiefly upon the visitors to the romantic scenery in the neighbourhood. Southey's residence, Greta Hall, is there. Every summer a religious convention is held at Keswick. Pop. (1931), 4,635.

KETLEY. Village of Shropshire. It is 1½ miles from Wellington and has a station on the G.W. Rly. The chief industry is coal mining. Pop. 2,200.

KETONES, the name given to a particular group of carbon compounds, of which acetone is the simplest representative. As a group they closely resemble the aldehydes. A ketone contains the carbonyl group (CO) united to two univalent hydrocarbon radicles. Acetone, e.g. is $CH_3.CO_3.CH$.

KETTERING, an ancient market town of England, Northamptonshire, on the L.M.S. Railway, 75 miles from London. It has a large corn market, and a museum and gallery, the gift of Sir Alfred East, which houses numerous specimens of his art. Boot and shoe manufacturing is the staple trade, but tanning, currying, and the manufacture of agricultural implements are also of importance. The Baptist Missionary Society was formed at Kettering in 1792. The town gives its name to a parliamentary division of the county. Pop. (1931), 31,220.

KEUPER, a name used for the terrestrial and lacustrine Upper Triassic series in central Germany, and also in the British Isles.

KEW, a suburb of London, county of Surrey, England, on the right bank of the Thames, opposite Brentford (to which a stone bridge crosses), and in the borough of Richmond. The Royal Botanic Gardens, commonly called **Kew Gardens,** belonging to the nation, are a great attraction for visitors to Kew. They contain the finest collection of plants in the world (about 24,000 different species), and are open to the public. The gardens, which were opened in 1841, contain Palm House, Temperate House, House for Victoria Regia lilies, Herbarium, Arboretum, Library, and various museums. There is also a sanctuary for wild birds in the grounds of Queen's Cottage. The main functions of the Kew staff are to advance the study of plant life, and to assist in the introduction of new economic plants in all parts of the Empire. In 1920 British Columbia gifted a flagstaff, 215 feet high, to the Gardens. The staff at Kew was, for example, responsible for the introduction of Para rubber into Malaya.

KEYES, Sir Roger John Brownlow. English sailor. Born in 1872, he entered the navy in 1885. He served for a time as a naval attaché and had commanded submarines when the Great War began. He served both in the North Sea and in the operations against the Dardanelles and in 1917 was made Commander of the Dover Patrol. He was responsible for the raids, in April, 1918, on Zeebrugge and Ostend, being rewarded with a knighthood. At the peace he was given £10,000 and made a baronet. In 1919 Keyes was chosen Commander of the Battle Cruiser Squadron of the Atlantic Fleet; in 1921 he became deputy-chief of the naval staff; in 1925 commander-in-chief in the Mediterranean, and from 1929–31 commander-in-chief at Portsmouth. In 1930 he was made an admiral of the fleet.

KEYHAM. District of Plymouth. It stands on the Hamoaze, on the G.W. Rly. and consists chiefly of

buildings associated with the naval dockyard, such as repairing yards and engineering works. Here is the college at which students are trained to become engineer officers in the navy, accommodating about 350 pupils.

KEYNES, John Maynard. English economist. Born at Cambridge, June 5, 1883, he was the son of J. N. Keynes, who was Registrary to the University, 1910–25. After a brilliant career at Eton and King's College, Cambridge, where he was president of the Union, Keynes entered the civil service in 1906 and served in the India Office and the Treasury. In 1919 he represented the Treasury at the Peace Conference in Paris, but soon after he left the service and wrote a criticism of the conference in *The Economic Consequences of the Peace*. He then became bursar of King's College, Cambridge, and chairman of the National Mutual Life Assurance Co. Since 1912 he has edited *The Economic Journal*. In 1926 he published *The End of Laissez Faire* and in 1930 declared in favour of a tariff on imported goods. Another of his books is *A Treatise on Money*, in 1931 he published *Essays in Persuasion*, and in 1932, with others, *Unemployment as a World Problem*. Keynes married the Russian dancer, Lydia Lopokova.

KEYS, House of. One of the two branches of the legislature of the Isle of Man. It consists of 24 members, who are elected by men and women electors, for seven years. With the council or upper house, it forms the parliament of the island called the Court of Tynwald.

KEYSERLING, Hermann. German writer and philosopher. Born in Estonia, July 21, 1880. He went to several universities, including Heidelberg, and spent several years in the study of science and philosophy. In 1908 he inherited his father's Russian estates and the title of count, but lost the former during the revolution of 1917. He settled at Darmstadt where, in 1920, he founded the School of Wisdom. After having spent much time in travel, he expressed his philosophy of life in the book which made him famous, and which has been translated into English, *The Travel Diary of a Philosopher*, 1925.

KEY WEST, a small, low-lying coral island at the southern extremity of Florida, United States. It is 75 miles from the mainland, with which it is connected by the Florida East Coast Railway, running on piers and arches over the forty-two keys. The railway cost £4,000,000, and occupied seven years in building.

Key West is the United States naval station in the south-east, and has become of great strategic importance as a guardian of the Panama Canal. The city is defended by a fort, and is a healthy winter-resort. Its nearness to the Cuban tobacco plantations has been the means of providing it with industries in raw and manufactured tobaccos. Settled in 1822, it became a city in 1832. Pop. 12,831.

KHABAROVSK, a town of the Far Eastern Area of Siberia, capital of the Maritime Province, at the confluence of the Amur and the Usuri. Pop. 51,400.

KHAMGAON (khăm-gä'on), a town of India, in Akola district, Berar, with a trade in cotton, grain, and opium. Pop. 10,100.

KHAN, a title given by Tartars, Persians, and other Eastern nations to princes, chieftains, commanders, and governors, but now generally reserved for governors of cities and provinces, these provinces being called *khanates*. Jenghiz Khan, the Mongol ruler, was the first to call himself *Khan*, although Gregory of Tours (A.D. 560) already designates the chief of the Huns (Avars) as *Chagnus*.

Khan is also another term for caravanserai, of which there are two kinds: one for pilgrims and travellers, with gratuitous entry, another, more commodious and with locked apartments, for traders, subject to a nominal charge.

KHANDESH (khăn-dāsh'), a district of British India, Bombay Presidency, forming the most northerly portion of the Deccan tableland, and intersected by the Tapit River; area, 10,952 sq. miles; pop. 1,718,000.

KHANDWA', a town of India, Central Provinces, with a large trade. Pop. 26,862.

KHARGA (*hăr'jā*), or **WAHIA EL KHARGA,** a town in Upper Egypt, about 100 miles S.W. of Girga, the capital of the oasis of the same name, and an important station for caravans on the way to Darfur and Central Africa. It contains numerous ruins, and an acropolis of great interest. Pop. 7,850.

KHARKOV (*hăr-kov'*), or **HARKOFF,** a government of Russia, in the Ukranian S.S.R.; area, 21,041 sq. miles; pop. 3,452,000. The country is open, the climate mild, the soil usually fertile, and agriculture is the chief pursuit of its inhabitants.

KHARKOV, capital of the Ukraine. It is 250 miles from Kiev and is one of the most important trading and manufacturing centres in Russia. Well served by railways, it has a trade in wheat and wool and many manufactures. Its fairs are notable, and it

has a broadcasting station (937·5 m., 20 kw.). Pop. 721,500.

KHARPUT (*hȧr'put*), a town of Asia Minor in the vilayet of Kharput, 60 miles north of Diarbekr, picturesquely situated on a rocky eminence in a plain watered by the Euphrates; a centre of American missionary effort. Pop. 30,000.

KHARTOUM (*hȧr-töm'*), capital of the Anglo-Egyptian Sudan, in the angle formed by the junction of the Blue with the White Nile. Founded by Mehemet Ali in 1830, it became the chief town in the Egyptian Sudan,

Khan: Caravan-Serail-i-Chah, Casbin

and a great emporium of trade. It was the scene of Gordon's heroic defence and death in fight against the Mahdists in 1885, but was ruined in the Mahdi troubles, being supplanted by Omdurman on the opposite side of the White Nile. Restored by the British after the battle of Omdurman (1898), it is the seat of the Gordon College for the Sudanese, and has other fine public buildings. Having easy communication by rail and river, it attracts many strangers. Pop. 50,463.—Cf. G. W. Steevens, *With Kitchener to Khartum*.

KHASI AND JAINTIA HILLS, an administrative district of Assam; area, 6,157 sq. miles; pop. about 161,000. The Khasis are a peculiar race, speaking a monosyllabic agglutinative language that seems to have no affinities with other Indian tongues.

KHATMANDU (*khȧt-mȧn-dō'*), or **KATMANDU,** capital of Nepal, a kingdom in Northern India, on the left bank of the Baghmati, on an elevated plateau 150 miles north by west of Patna, with which it is connected by an important trade route. It is well built, and has many picturesque temples and pagodas. The chief building is the palace of the Maharajah, with a modern reception-room. It is the seat of a British Resident, and has considerable trade with Tibet. Pop. about 80,000.

KHAYA, a genus of trees of the ord. Meliaceæ, consisting of only one or two species. *K. senegalensis*, a native of Senegambia, yields a valuable timber resembling mahogany, and its bark is used as a fever remedy.

KHEDIVE (*ke-dēv'*), a word from the Persian, signifying *Prince*, the title of the rulers of Egypt, originally granted by a firman from the Sultan in 1867 to Ismail Pasha, then *Vali* or Viceroy of Egypt. The title existed till 1914, when after the deposition of the last Khedive, Abbas Hilmi, his successor received the title of Sultan.

KHERSON, town of Ukraine, U.S.S.R. 90 miles from Odessa, it stands on the Dnieper, being a river port. There are some manufactures and a trade in timber, hides, etc. Pop. 58,809. Another **Kherson** is 2 miles from Sevastopol in the Crimea.

KHIVA (*hē'vä*), or **CHIVA**, a former khanate of Central Asia, in Turkistan. It formerly occupied a large area on either side of the Amu Darya or Oxus, but after the cession to Russia, in 1873, of its territory on the east of the Amu, it was confined to the west side of this river. It was of a triangular shape, each of its three sides—of which the Amu formed one—being about 300 miles in length. One of its angles rested on the Sea of Aral.

A great part of the surface consists of deserts, thinly inhabited or uninhabitable; but along the Oxus the land consists of rich alluvial loam of the greatest natural fertility, assisted by irrigation, and securing luxuriant crops of grain, cotton, madder, fruit (including the vine), and vegetables. The winter is neither very severe nor prolonged, but the summer is very hot. Manufactures are very unimportant. Before the outbreak of the European War trade was being rapidly developed by Russian influence, especially by the Transcaspian Railway from the Caspian to Samarqand. A Soviet government was established at Khiva in 1921, but the khanate is now part of the Uzbek Republic. *See* KHOREZM; UZBEK.

KHIVA, city of the Soviet Republic of Uzbekistan. It is 470 miles from Tashkent and is an important trading centre. At one time it was the capital of a khanate, which lay to the north of the Sea of Aral and covered some 24,000 sq. miles. It became Russian in 1873. After the Great War it passed under the rule of Bolshevists and was for a time the capital of a small Soviet republic. Pop. 20,000.

KHOI (*ho'i*), a town of Persia, province of Azerbaijan. During the European War Khoi was occupied by the Russians and afterwards by the Turks, who evacuated the town after the signing of the armistice on 30th Oct., 1918. Pop. about 25,000.

KHOJA, or **KHAJA**, name of a Mahommedan sect of India which migrated from Persia. The Aga Khan was at one time their *Imam*. They were converted from Hinduism about 400 years ago, and, as Ismaili Mahommedans, they are heterodox Shiahs.

KHOJEND, or **KHOJENT**, a town in the Uzbek Republic, U.S.S.R., formerly in the khanate of Khoqand, on the River Sir Darya. It stands on elevated ground, and was fortified by the Russians. It was formerly of much commercial importance. Pop. 37,000.

KHOQAND, a town of the Uzbek Republic, U.S.S.R., is situated on both sides of the Sir Darya. It manufactures silk and cotton fabrics, and is the centre of a large trade, ranking next in importance to Tashkent in this region. Pop. 118,854.

KHOREZM, from 1920 to 1924 an Asiatic Soviet Republic, coterminus with the former Khanate of Khiva. In 1924 it united with Bukhara to form the Uzbek S.S.R. (q.v.).

KHOTAN, a town and oasis in the south-west of Sinkiang, China, 180 miles S.E. of Yarkand. It is the centre of the jade industry. Pop. 26,000.

KHOTIN (*hō'tin*), or **CHOCZIM**, a town of Rumania, in Bessarabia, on the Dniester, near the Austrian frontier. It figured much in the wars of the Poles, Austrians, Turks, and Russians. Pop. 19,561.

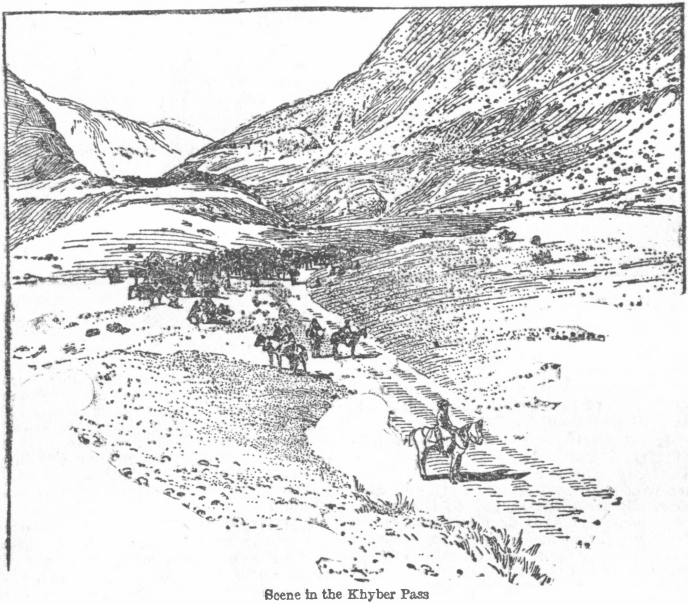
KHURASAN (*ho-rä-sän'*), a province of Persia, bordering on Afghanistan; area, about 150,000 sq. miles; pop. estimated at 1,000,000. Much of the surface consists of deserts, but there are also fertile districts producing crops of cotton, hemp, and aromatic and medicinal herbs. The most valuable mineral is the turquoise from the ancient mines of Nishapur. The principal manufactures are silk and woollen stuffs, carpets, small-arms, and sword-blades. About two-thirds of the inhabitants are Persians proper; the remainder are chiefly Turcomans and Kurds. Capital, Meshed.

KHURJA (*khör'ja*), a town and important railway junction of India, United Provinces, with a fine Jain temple and other good buildings, and a flourishing manufacture of and trade in cotton. Pop. 25,719.

KHUZISTAN (*hu̯-zis-tän'*), or **ARABISTAN**, a province of Persia, bounded on the south by the Persian Gulf, and on the west by Asiatic Turkey; area, 25,700 sq. miles, watered by the Karun and other streams; pop. estimated at 200,000. In the south there are some extremely fertile plains, producing crops of rice, cotton, tobacco, indigo, silk, and grain. The interior and north are mountainous, and flocks and herds maintain their inhabitants. Trade is chiefly carried on with Baghdad and Basra. Dizful, Shuster, and Mohammerah are the chief towns. During the European War British troops policed this part of Persia to maintain control of the Transcaspian Railway.

KHYBER (khī'bĕr), a famous mountain pass between India and Afghanistan, the chief gate to Afghanistan from Peshawar, and by means of which India has been invaded from time to time. It was the scene of severe fighting in the Afghan War. Its position renders it of great strategic importance to India, and it is now under the jurisdiction of the North-West (Frontier) Province. The pass is about 35 miles long, very narrow in parts, and its summit is 3,373 feet above sea-level. On either side precipices rise up from 600 to 1,300 feet in height.

In order to promote peace in the North-West Frontier by strengthening the powers of defence against incursion, a railway has been built from Peshawar to the frontier fort of Landi Kotal, passing through Jamrad. It is a broad-gauge track, and passes through eight or nine tunnels. The construction of this line makes the reinforcement of garrisons and the defence of the Indian exit of the Khyber Pass so much easier that the Pass itself will lose much of its importance as an open gateway to India for all the hill tribes of the north.



Scene in the Khyber Pass

KHYERPUR, or **KHAIRPUR** (khīr-pör'), a town of India, in Sind, 15 miles east of the Indus., capital of a small state of the same name. Pop. about 14,120.

KHYRABAD (khī-rā-bād'), a town of India, in Oudh, with numerous mosques and Hindu temples, and large fairs. Pop. 14,000.

KIAKHTA (ki-ȧh'tȧ), a town of Siberia, U.S.S.R., in the Buriat-Mongol about 95 miles s. of Lake Baikal, on the Russian-Chinese frontier, adjoining Troitskosavsk (Russia) and Maimachin (China). It formerly monopolized the overland trade between Russia and China, but declined after the Treaty of Peking (1860). Pop. 23,000.

KIANGSI, U.S.S.R., a province of China; area, 69,480 sq. miles; estimated pop. 16,255,000. It is profusely watered by numerous streams, and the greatest portion of the soil is highly productive, especially in rice and sugar. The province manufactures paper, cotton, and silk goods, and is celebrated for its porcelain. Its capital is Nanchang, and the treaty port Kiu-Kiang, opened in 1861, is in this province.

KIANGSU, a maritime province of China, traversed by the Grand Canal, and watered in its southern part by the Yangtze Kiang. Kiangsu was once traversed by the Hwang Ho (Yellow River), but in 1852 the river found a new course farther to the north, and only the old water course now traverses the province; area, 69,498 sq. miles; pop. (estimated), 27,563,410. Nanchang is the capital. Other important towns are Shanghai, one of the chief ports of the province, Chin-Kiang and Soochow, a treaty port. Tea, rice, cotton, and some of the finest silk in the world are produced.

KIAOCHOW, or **KIAU-CHAU,** on bay of same name, a territory on the east coast of the Chinese province of Shantung; area, 193 sq. miles; pop. 230,000. Kiaochow was seized by Germany in 1897, and the lower harbour and district were transferred to the Germans on a ninety-nine years' lease in 1898, forming a protectorate of the German Empire until captured by Anglo-Japanese forces in Nov., 1914.

The chief town and port is Tsingtao (q.v.), which is a railway terminus of great value. Japan took over the lease in 1919, but after the Washington Conference returned it to China in 1922. Silk is manufactured and cereals are raised, the chief exports being ground-nut, bean-oil, tobacco, and Shantung pongees. The standard of currency is the Mexican dollar.

KIDBROOKE, district of London. It is in the borough of Greenwich, on the S. Rly., 7 miles from the city. Here is a station of the Royal Air Force.

KIDD, Benjamin. British sociologist. Born 9th Sept., 1858, after being a clerk in the Civil Service he travelled in America and Canada in 1898, studying economics, and in 1902 did the same in South Africa. In 1904 he published *Social Evolution,* which was translated into many languages, including Chinese. He has also written *The Control of the Tropics* (1898) and *Principles of Western Civilisation* (1902). He died at Croydon, Oct. 2, 1916.

KIDD, William, privateer and pirate, known as *Captain Kidd,* stated to have been born at Greenock, Scotland, in 1650, was hanged at Execution Dock, London, 23rd May, 1701. In 1696 he became captain of a ship, the *Adventure Galley,* a thirty-gun vessel, fitted out by Lord Bellomont for William III and the Government to suppress piracy, Captain Kidd being granted letters of marque and a special commission to harass all Frenchmen.

He sailed in May, 1696, and commissioned his ship fully at New York, proceeding to Madagascar, where he became a pirate himself. He was arrested in Boston in 1698, and returned to England for trial on a charge of piracy and of murdering one of his crew, two of his shipmates having turned king's evidence. He is supposed to have buried immense treasure in Long Island Sound or on the banks of the Hudson River, but nothing has ever been located.—Cf. W. W. Campbell, *An Historical Sketch of Robin Hood and Captain Kidd.*

KIDDERMINSTER, a municipal borough and market town of England, county Worcester, on the banks of the Stour. Kidderminster is famed for the manufacture of carpets. The industry dates from 1730, and Kidderminster carpets are said to have become famous from the durability of their colour, a result obtained by using the water of the River Stour, which contains iron and fuller's-earth. Cloth was also manufactured, but the industry appears to have declined from the eighteenth century with the introduction of machinery.

There is a grammar school, founded in 1637, and a statue to Sir Rowland Hill, who was a native of the town. From 1832 to 1918 Kidderminster returned one member to the House of Commons. It gives name to a parliamentary division of the county. Pop. (1931), 28,914.

KIDNAPPING, the act of getting forcible and illegal possession of the person, an offence of varied degree, but always punishable by fine or imprisonment. In its more modern and limited sense it is applied to the obtaining of slaves or native labour by force, as practised by the Arabs in Africa. In Great Britain this term was sometimes applied to the impressment recruiting for the army and navy.

KIDNEYS, two of the abdominal viscera, in the form of two glands, the function of which is to secrete the urine from the blood. They are situated one on each side of the vertebral column at the back part of the abdominal cavity on a level with the last dorsal and two upper lumbar vertebræ. The right kidney lies at a slightly lower level than the left. They are of the well-known 'kidney-bean' shape. The concave side of each kidney is turned inwards and towards the spine.

The depression on the inner side is termed the *hilum,* and from this notch the excretory duct or *ureter* proceeds, whilst the blood-vessels of the kidney enter and leave the gland at this point. The weight of each male kidney

is about 5 oz., those of the female weigh each somewhat less.

Each gland is covered by a thin sheath of fibrous tissue, which has no extension into the substance of the organ. The internal substance is divided into an outer deeper-coloured *cortical* portion or *cortex*, and an inner lighter-coloured or *medullary* portion. Both portions consist of tubes (*tubuli uriniferi*), which run a very tortuous course in the cortex, but continue as straight tubes in the medulla. The latter is formed into a series of conical fleshy masses, about twelve in number, called *pyramids of Malpighi*. These project into a cavity formed at the hilum by the expansion of the excretory duct, and called the *pelvis* of the kidney. Prolongations of the pelvis, called the *calyces*, invest the apices of the pyramids and dip in between them like funnel-shaped tubes.

Now in the cortex the end of a tubule is dilated into a sac or capsule; into this a small branch of the renal artery enters, and then breaks up into a tuft of capillary blood-vessels. This tuft is called the *glomerulus*, and it and its capsule form a *Malpighian corpuscle*, about $\frac{1}{125}$th of an inch in diameter; so that a tubule, beginning at its dilated end, runs a tortuous course in the cortex, reaching the medulla becomes straight, and finally opens into the pelvis on the apex of a pyramid.

The blood-vessels of the kidney consist of the *renal artery*, derived from the aorta, and the *renal vein*. The branches of the artery enter the gland at the hilum, and pass into the substance of the gland between the papillæ. Finally they reach the cortical portion, and therein subdivide into the minute vessels which form the *glomeruli* of the Malpighian bodies. The renal veins leave the kidney also at the hilum, and pour their contents into the great main vein of the lower parts of the body (*vena cava inferior*). The nervous supply of the kidney is derived from the renal plexus, and from the solar plexus or large sympathetic mass of the abdomen. The separation from the blood of the constituents of the *urine* is accomplished in the glomeruli, and by the uriniferous tubules, the former straining off the watery parts of the blood, whilst the latter remove the more solid matters. Gradually the secreted urine passes through the tubules, into the pelvis of the kidney, thence into the ureters, which in turn open into the bladder behind its orifice or neck. The urine is constantly entering the bladder drop by drop.

Inflammation of the kidneys is known as *nephritis*. Occasionally concretions of substances precipitated from the urine accumulate in the kidney to form renal calculi (stone in the kidney), and cause, in their passage through the ureter, most excruciating pain.

KIDNEY-VETCH, Anthyllis, a genus of plants, nat. ord. Leguminosæ. There are many species, both shrubby and herbaceous, but the only one found in Great Britain, chiefly on calcareous soils, is the *Anthyllis vulneraria*, commonly called Lady's Fingers, with pinnate unequal leaves, and heads of flowers generally yellow, sometimes graduating towards scarlet.

KIDWELLY, an ancient municipal borough and seaport of Wales, in Carmarthenshire, on the River Gwendraeth, near its mouth in Carmarthen Bay. It has an interesting old castle, ancient church, works for lime and tin, collieries, and a good harbour. Pop. (1931), 3,161.

KIEL (kēl), a town of Germany (Prussia), in Schleswig-Holstein, beautifully situated on a deep bay of the Baltic, 54 miles north by east of Hamburg. The most notable buildings are the university, founded in 1665, and a sixteenth-century palace.

Until 1919 Kiel was a fortified naval port of Germany, with an imperial dockyard, and a station of the greater part of the imperial fleet. Enormous sums were spent by the German Government upon the docks and shipbuilding yards, and Kiel was converted into a great naval arsenal. The activity ceased in 1918, when Germany was compelled to surrender her fleet to the Allies. It has a broadcasting station (232·2 m., 0·25 k.w). Pop. 213.881.

KIEL CANAL, a ship canal, 60 miles long, 36 feet deep, traversing Schleswig-Holstein from Brunsbüttel to Kiel harbour. Construction begun, June, 1887; opened, June, 1895; deepening and widening begun, 1908; re-opened, 1914. The canal is electrically lighted, and may be navigated at night. Formerly a State water-way, Kiel is now (since 1919) open to international traffic, and is a commercial time-saver, linking up the North Sea directly with the Baltic.

KIELCE (ki-el'tse,) a government of Poland; area, 9,939 sq. miles; pop. (1931), 2,935,680. It is watered by tributaries of the Vistula, and partly covered by offsets of the Carpathians. —the capital, **Kielce,** is an ancient town about 50 miles north-east of Cracow. During the European War the battle of Kielce, between the Russians and the Austrians, was fought on the 3rd Nov., 1914. Pop. (1931), 58,397.

KIERKEGAARD, Sören Aaby, Danish philosopher, born 5th May, 1813, at Copenhagen, died there 11th Nov., 1855. The majority of his works were published under pseudonyms, and the most important are: *Enten-Eller* (Either-Or), *Stages of Life*, and *On Christian Training*. Kierkegaard's influence upon Danish and Norwegian thought was very considerable.

KIESERITE (kē'zėr-it), $MgSO_4,H_2O$, a hydrated magnesium sulphate, obtained at Stassfurt, and now employed as a source of epsom salt, and in the manufacture of manures. Mixed with quick-lime and water it hardens into a mass which, after heating, pulverizing, and again mixing with water, becomes of a marble-like consistency, and may be made into ornamental articles.

KIEV (ki-ev'), or **KIEFF** (ki-ef'), a former government of S.W. Russia, now part of the Ukrainian S.S.R.; area, 19,676 sq. miles; pop. 5,000,000. The surface is in general flat, intersected occasionally by hills of moderate elevation along the course of the Dnieper is the only stream navigable to any extent. The climate is mild, the summer very hot and dry. Before the outbreak of the European War, and till the Revolution of 1917, the province was the centre of the beet-sugar industry in Russia.

KIEV, a town of the Ukraine, U.S.S.R. is situated on the right bank of the Dnieper, crossed by a suspension bridge, at one time the finest in Europe. Kiev really consists of three towns, Podot, Old Kiev, and Pechersk, all more or less fortified. Connection by rail with Odessa and Kursk did much to stimulate the trade of the town.

Kiev is supposed to have been founded in the fifth century A.D., possesses a beautiful eleventh-century cathedral and a university, founded in 1588, and transferred from Vilna to Kiev in 1833. It was occupied by the Germans in 1916–7, and after the Russian Revolution the town changed hands several times. It was captured by the Bolshevists in 1917, by Petlura in 1919, by the Poles in May, 1920, and soon afterwards again by the Soviet Government. Pop. (1926), 539,500.

KIKUYU, a village in Kenya Colony, 15 miles N.W. of Nairobi.

KILBIRNIE, town of Ayrshire. It is on the River Garnock, 20 miles from Glasgow, and is reached by the L.M.S. Rly. The chief industry is engineering. There are ruins of a castle, at one time a seat of the Earl of Crawford. Near is Kilbirnie Loch. Pop. 8,193.

KILBRANNAN SOUND, the channel in the Firth of Clyde, Scotland, between the Isle of Arran and the Peninsula of Kintyre. It is famous for its herring fishing.

KILBRIDE, town of Ayrshire. It stands near the coast, with a station on the L.M.S. Rly., 4 miles from Ardrossan. On the coast is a little watering place called Seamill. Pop. 4,498.

Kilbride, which means the Church of S. Bride, is properly **West Kilbride. East Kilbride** is a town of Lanarkshire. There is also a **Kilbride** in Skye.

KILBURN, district of London. To the north-west of the city, it is partly in Hampstead and partly in Willesden. In the 18th century a spa called Kilburn Wells existed here. The district includes Kilburn Park.

KILDA, ST., a small and rocky island in the Atlantic Ocean, belonging to Scotland, 40 miles north-west from the north-west extremity of the island of North Uist. It is about 3 miles long by 2 miles broad, a great portion of its sea-front being composed of perpendicular precipices, which in some parts rise to a height of many hundred feet. The only hamlet lies at the head of East Bay, and contains some thirty houses of modern construction.

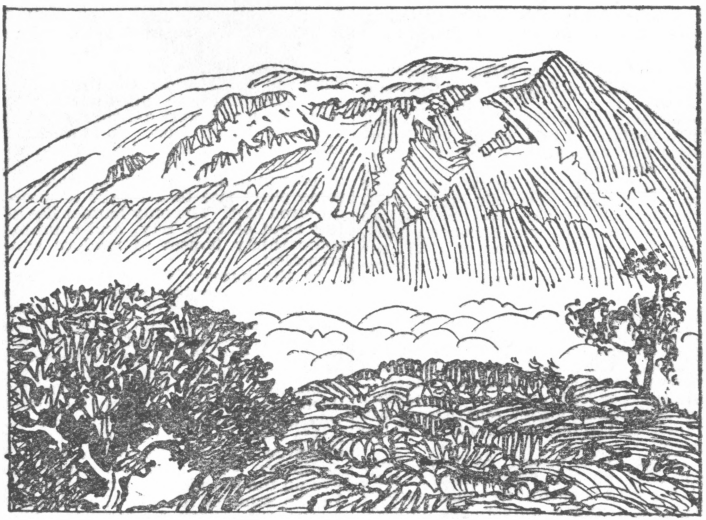
In the interior there is sufficient pasture for a limited number of cows and sheep; patches of potatoes, oats, and bere are grown, and, together with fish and sea-fowl, supply the inhabitants with food. In consequence of the privations suffered by the inhabitants (about forty in number) during the winters, when the island was almost completely isolated, St. Kilda was evacuated in 1930. It was afterwards purchased by the Earl of Dumfries, some of whose employees live on the island during the summer. In the summer months the island is frequently visited by tourists. The St. Kilda group of islands and stacs (St. Kilda, Soay, Boreray, Dùn, &c.) was surveyed and mapped in 1927.

KILDARE', a county of the Irish Free State, in Leinster; length, 40 miles; breadth, 27 miles; area, 418,644 acres. The surface is flat, or gently undulating, the soil mostly a rich loam. Oats, potatoes, barley, and turnips are the principal crops. The manufacture of woollens is carried on to some extent, but the chief occupations are agricultural. Principal rivers: Barrow, Liffey, and Boyne. Chief towns: Naas (the county town), Athy, and Newbridge. The population at the 1911 census was 66,627; by the 1926 census it was 58,028.

KILDARE, county town of above county, reputed to have originated in

the religious community founded by St. Brigid (A.D. 490). The cathedral described by Cogitosus (9th century), and burned by the Danes in 1050 and 1067, was rebuilt in 1875. A round tower, 105 feet high, adjoins the cathedral, and a castle erected by De Vesci (13th century) occupies the site of one founded by Strongbow in 1169. There are also traces of an ancient Carmelite monastery. Contiguous to Kildare is the 'Curragh of Kildare,' formerly the Aldershot of Ireland, and equally reputable as an Irish racing centre. Pop. (1926), 2,639.

KIL'IMANJARO (The Great Mountain), the highest mountain in the African continent, situated in Tanganyika territory, forming one of the boundary-marks between Tanganyika and Kenya Colony. It has two extinct volcanic peaks, Kibo (19,600 feet) and Kimawenzi (17,000 feet), which are 7 miles apart and are connected by a saddle (14,000 feet). Kibo is snow-capped and has many glaciers. At its summit there is a crater some 650 feet deep and 6,500 feet in diameter. Kimawenzi has no permanent snowcap. Kibo was climbed by Captain Johannis in 1902. The ascent was first made by a woman in 1927.



Kilimanjaro

KILINDINI, the chief harbour on Mombasa Island, Kenya Colony. All deep-water traffic for Mombasa comes to Kilindini.

KILKEN'NY, a county of the Irish Free State, in Leinster, has an area of 509,470 acres. The surface is generally level. The principal rivers are the Barrow, Nore, and Suir. The soil is for the most part light and dry, some valleys being extremely fertile, and dairying is carried on extensively. The chief crops are wheat, oats, barley, potatoes, and turnips. Beds of fine black marble are quarried near the town of Kilkenny, and anthracite coal is raised chiefly for local consumption. In 1918 Kilkenny County returned two members to the Imperial Parliament. The population at the 1911 census was 75,000; by the 1926 census it was 70,990.

KILKENNY, a city of Ireland, county town of Kilkenny County, 73 miles S.W. of Dublin, delightfully situated on both sides of the Nore. The manufacture of coarse woollens, brewing, and the working of Kilkenny black and foreign marbles into chimney-pieces, monuments, &c., form the chief industries of the town. Pop. (1926), 10,056.

KILLAR'NEY, a market town of Kerry, Irish Free State, in the midst of beautiful scenery, within a mile of the celebrated lakes to which it gives its name. These lakes are three in

number, the lower 4½ miles long by 2 miles broad, the middle 1½ miles long and ½ mile broad, the upper 3 miles long. They are interspersed with wooded islands, and the lofty banks are also richly wooded. Pop. (1926), 5,325.

KILLDEER (*Ægialitis vocifĕrus*), a variety of plover, common in America, and so called from its plaintive cry.

KILLIECRAN'KIE, a pass of Scotland, in the Grampians of northern Perthshire, above the Rivery Garry. Here Claverhouse, Viscount Dundee, defeated the forces of William III under Mackay in 1689, but was killed in the moment of victory.

KILMACOLM, watering place of Renfrewshire. It is on the Firth of Clyde, 8 miles from Greenock, by the L.M.S. Rly. Here is a hydropathic establishment. Pop. 5,303.

KILMAIN'HAM, suburb of Dublin, Irish Free State, between the Liffey and the Grand Canal. It is chiefly known for its Royal Hospital, founded in 1675, and its county jail. The Kilmainham Treaty (April, 1882) was an informal arrangement made between Gladstone and Parnell, by which the Irish leader, who was then a prisoner at Kilmainham, was released after promising to exert his influence against the commission of agrarian crime in Ireland.

KILMAR'NOCK, a municipal and police burgh of Scotland, Ayrshire, 20¾ miles S.W. of Glasgow. It is one of the principal market towns of Scotland, and is an important railway junction on the Midland route between London, Carlisle, and Glasgow, situated upon the London, Midland and Scottish Railway, which has extensive locomotive-works in the vicinity.

Kilmarnock contains the Dairy School for Scotland. The town was intimately associated with Robert Burns, and many MSS. are preserved in the Burns Memorial (Kay Park). There are three parks (Kay, Dean, and Howard), many good buildings, and extensive boot-factories and engineering-shops. The Cheese Show of Scotland is held at Kilmarnock yearly, and is a very important Scottish agricultural event. Pop. (1931), 38,099.

KILSYTH', a town and police burgh of Scotland, in Stirlingshire, 13½ miles N.E. of Glasgow. The inhabitants are employed in iron- and coal-mining. The battle of Kilsyth was fought on 15th Aug., 1645, between the Covenanters and the forces of Montrose, and ended in a victory for the latter. Pop. (1931), 7,551.

KILWIN'NING, a police burgh of Scotland, Ayrshire. It is 24 miles S.W. of Glasgow, stands on an important junction of the London, Midland and Scottish Railway, which serves it by two distinct lines from Glasgow. It has ruins of an abbey, founded in 1140, which was dedicated to St. Winnin and ultimately gave its name to the town.

The annual ceremony of the shooting at the popinjay, described in Scott's *Old Mortality*, was held at Kilwinning until 1870. Eglinton Castle, the seat of the Earls of Eglinton, formerly at Ardrossan, is in the vicinity. The town is the birth-place of Scottish Freemasonry. Pop. (1931), 5,324.

Upper Lake, Killarney

KIM'BERLEY, a city of Cape Province, capital of Griqualand West, and centre of the diamond-mining industry of that district. It lies about 600 miles N.E. of Cape Town, with which it has a railway connection, and stands on an open plain some 4,000 feet above sea-level. There is a theatre, two cathedrals, and many other fine buildings.

The diamond-mines are grouped under De Beer's Consolidated Mines, and are four in number—Kimberley, Du Toit's Pan, De Beer's, and Bultfontein. These mines are fenced in with barbed wire, as are also the compounds wherein the native workers are confined while employed in the mines, a necessary precaution against illicit diamond buying and trading. The white workers live in a specially constructed village on the outskirts of Kimberley.

The town was first established by pioneers in 1870, who found diamonds and camped on the spot. In 1871 the mines were taken under the protection of Britain, and the town was named after the Earl of Kimberley, then Secretary of State for the Colo-

nies. De Beer's Consolidated Mines purchased the entire rights in 1889. In 1899, when war broke out, Kimberley, then defended by a garrison of the regular army, was attacked by the Boers, and was besieged, being relieved by General (afterwards Lord) French and a cavalry division on 15th Feb., 1900. The mines were closed in 1914 and reopened in 1916. Pop. 39,702 (18,288 white); white pop. 1931, 18,471.

KIMBERLEY, a northern district of Western Australia, brought into notice by the discovery of gold-fields in 1886. It contains immense tracts of splendid pasture, and much land suitable for stock, wheat, sugar, and tobacco. The chief port for the district is Derby, on the Fitzroy River.

KIMBERLEY, Earl of, English title borne by the family of Wodehouse. John Wodehouse, a member of an old and influential Norfolk family, was born 7th Jan., 1826, and educated at Eton and Christ Church, Oxford. In 1846 he succeeded his grandfather as Baron Wodehouse.

In politics a Liberal, he was Under-Secretary for Foreign Affairs, 1852–56 and 1859–61. In 1864–66 he was Lord-Lieutenant of Ireland. From 1868–70, having been made an earl in 1866, he was Lord Privy Seal, and in 1870–74 was Secretary for the Colonies. In 1880–82 he was again Secretary for the Colonies and in 1882–85 and 1886 Secretary for India. From 1892–94 he was again Secretary for India and from 1894–95 Foreign Secretary. He was leader of the Liberal Party in the House of Lords from 1896 until his death, April 8, 1902. His son, John, became the 2nd earl.

KIMBOLTON, market town of Huntingdonshire. It is 11 miles from Huntingdon, on the L.M.S. Rly. It is named after the little River Kym, which flows by it. Pop. 902.

KIMCHI (kim'*hē*), **David,** generally quoted by his initials RADAK (Rabbi David Kimchi), one of the most famous Jewish rabbis of the Middle Ages, born towards the end of the twelfth century at Narbonne, died 1240. He wrote commentaries on almost all the books of the Old Testament, and rendered essential service to Hebrew literature by the composition of his *Grammar* and *Dictionary of Hebrew Roots.* His father Joseph and his brother Moses also distinguished themselves as Hebrew scholars and theologians.

KIMMERIDGE CLAY, a bluish slaty clay, containing some carbonate and sulphate of lime, found in thick deposits in the south of England (Kimmeridge in Dorsetshire) and the north of France. It is a member of the Upper Oolite. (*See* GEOLOGY.)

KIMPULUNG, (1) a town of Rumania, in the Bukovina, formerly in Austria; situated on the Moldava. Pop. 5,534. (2) A town of Wallachia, the ancient capital of the principality, situated in a valley at the foot of the Carpathians, 80 miles N.W. of Bucharest. Pop. 10,124.

KINCAR'DINESHIRE, or **THE MEARNS,** a maritime county on the east coast of Scotland; area, 244,482 acres. About half the county consists of cultivated land, woodland, improvable moor, &c. The Grampian Mountains, by which it is traversed north-east to south-west, occupy a large portion of its surface, their highest summit within the county being Battock (2,555 feet).

The principal rivers are the North Esk, Bervie, Carron, Cowie, and Dee. The most fertile portion is the Howe of the Mearns, part of the Strathmore valley, between the Grampians and a range of low coast hills. The principal crops are oats, barley, wheat, turnips, and potatoes. Stonehaven is the county town. Pop. (1931), 39,864.

KIN'DERGARTEN was the name given by Friedrich Froebel in 1840 to his Nursery School for Little Children, which he describes as "an institution for fostering family life"—"an institution for the self-teaching, self-education, and self-culture of men by means of play, of creative original activity, and of voluntary self-instruction."

In instituting and developing his kindergarten Froebel appealed to women—in the first place to the mothers; and he worked out a plan for the training of women in the care of children—nurses, nursery governesses, and kindergarten mistresses—as well as superintendents of both sexes for crèches, playgrounds, and infant schools.

The purpose of the kindergarten, as stated by its founder, is the awakening of the bodily and mental powers—"so that every child, no matter of what rank or condition, may here be able to work out and faithfully express his real nature, character, and true vocation in life; educating himself as well as being educated."

The means chosen to realize this purpose were:

1. Songs and Games and Simple Gymnastic Exercises.—The *Songs for Mothers and Nursery Songs* (Mutter und Kose Lieder) were adapted by Froebel for the use of the mother with her own tiny children, many of them having their origin in the simple folk ditties of his country. Many of

the games were adaptations of those which children habitually played or which mothers played with their babies.

2. **Educational Toys** which, apart from the symbolic value which Froebel placed upon them, were well adapted to assist the unfolding of childish powers. These toys are known as Froebel's 'Gifts.'

Gift I consists of six wooden balls—red, blue, yellow, purple, green, and orange—each with its own woollen string.

Gift II consisted at first of a wooden ball and cube, to which was later added the wooden cylinder with which Froebel intended to illustrate one of his favourite laws—that of 'the reconciliation of opposites.'

Gift III was a 2-inch cube divided into eight cubes of 1 inch.

Gift IV was a similar cube divided into eight oblong bricks.

Gift V was an enlargement and elaboration of Gift III, and contained 27 1-inch cubes, some of which were divided into half-cubes and some into quarter-cubes.

Gift VI was in the same way an elaboration of Gift IV.

Gift VII consists of coloured tablets for making patterns.

Gift VIII consists of sticks and thin strips of wood and metal rings, which were used for outlining objects or patterns.

Gift IX consists of beads for threading and peas or pebbles.

The Gifts were intended to be used as individual employment and mainly for free play—that a child might through 'creative self-activity' express himself, and also make acquaintance with mathematical and other ideas.

3. **Materials for Educational Handwork,** known as 'Occupations.' These consisted of:

(*a*) Plastic material, such as sand and clay.

(*b*) Material for more permanent constructions, such as paper for folding, twisting, and cutting, and interweaving or 'mat-plaiting.'

(*c*) Drawing, pricking, sewing, and writing on chequered paper.

4. **Nature Study.** This was considered by Froebel a very important factor in the education of a child, as leading him to understand and reverence life and God. He wished children to live amid the life of nature, to recognize the care of birds and other animals for their young, and from this to understand something of the love of parents and of God. He desired to have all children trained to tend growing plants, and thus to satisfy their love of digging and watering, and to give them the joy of helping other life in the simple way that they could understand.

5. **The Telling of Stories.** Though the story is generally given an important place in a modern kindergarten, Froebel does not emphasize this in his plans for the youngest children. Very simple tales and rhymes in connection with momentary needs and interests are all that the child's craving for physical activity will allow.

History of the Kindergarten. The first kindergarten was opened in 1837 in the village of Blankenberg, near the hamlet of Keilhau, in the Thuringian Forest, where Froebel had, twenty years previously, established a school for boys of all ages. In 1839 Froebel and his chief helper of early days, Middendorf, founded in Dresden an Institution for the Care of Little Children, and a similar kindergarten school in 1840 in Frankfurt; and many others were instituted later in various parts of Germany. In 1850 he received from the Duke of Meiningen his country seat of Marienthal to accommodate a new Training College for Kindergarten Teachers.

In Aug., 1851, an entire prohibition of the Kindergarten in Prussia was issued by the Education Minister von Raumer, on the grounds that they were revolutionary, atheistic, and socialistic; and Bavaria in the same year ordered the closing of all kindergartens except those which were attached to the orthodox Protestant churches. The cruel misinterpretation of his aims and his work was a blow from which Froebel was unable to recover, and he lived only until the following June.

In England the first kindergarten of any importance was opened by Madame Ronge at 32 Tavistock Place, London. Madame Ronge also lectured in Manchester, and the outcome of her lectures was the foundation of the Manchester Kindergarten Association, the oldest kindergarten association in England.

The Froebel Educational Institute in West Kensington, which has ever since been known as the largest and most important kindergarten training college, was founded in 1894. It consisted of a training college for students, with a demonstration school built as a wing of the main block.

In response to the strong desire of its principal for a kindergarten for quite poor children, and largely

through the generosity of Mr. Claude Montefiore, a low-fee demonstration school was opened by the Institute a few years later, but its status was raised when a real 'free kindergarten' or 'nursery school' was started by voluntary contributions in Notting Dale, and called the Michaelis Free Kindergarten, enabling its workers to carry out in the fullest sense Froebel's motto "Let us live with our children."

The work of modern kindergartens has fully justified Froebel's conceptions of the absolute need for freedom in development through accepting what is best in the environment, building it up into the growing organism, and using it in creative work. Froebelians have never hesitated to study modern educational developments in theory and practice, and to adapt to their needs what they find to be good in them. This has led to the abandonment of some of Froebel's material, and to a modified use of the rest. Yet the spirit of Froebel, the willingness to study little children and to 'follow' in order to help and guide them, is still seen in every true kindergarten.—Cf. E. R. Murray, *A Story of Infant Schools and Kindergartens.*

KINEMAT'ICS is the mathematics of motion. It is that part of *kinetics* (q.v.) which is independent of the ideas of *mass* and *force*. It has been termed 'the geometry of motion,' but while geometry deals with space only, kinematics takes account also of the element of time. Intermediate between geometry and kinematics stands the theory of displacement, or change of position, more especially change of position of points and rigid bodies. For the theory of displacements in the case of non-rigid bodies, *see* ELASTICITY and HYDRODYNAMICS. Displacement theory may be regarded as a branch of geometry since it excludes the idea of *time*.

The displacement of a point is a *vector*, and its theory is simply the geometry of *vectors* (q.v.). The theory of displacement of rigid bodies is comparatively modern. Michel Chasles (1793–1880) first stated the fundamental proposition for the displacement of a rigid plane body in its own plane, viz. that in general one point of the body (or of a rigid extension of it) retains its original position (is *latent*), so that the displacement could be accomplished by a rotation about that point, which is called the 'centre of displacement,' or 'centroid.'

The exceptional case of *translation*, in which every straight line in the body remains parallel to its original position, may be viewed as a case of an infinitesimal rotation about an infinitely distant centroid.

The corresponding theorem for the case of a rigid solid displaced in space is that in general one straight line in the body (or in a rigid extension of it) remains in the same straight line after displacement, but displaced along that line, while the body has rotated about the line; that is to say, the displacement can be accomplished by a 'screw motion.' This includes the special cases (1) pure translation (without rotation), and (2) rotation about a fixed axis.

From these fundamental theorems we can deduce that any continuous motion of a rigid plane body in a plane is equivalent to a rolling motion of the 'body centrode' on the 'space centrode,' the former being the locus in the body of successive positions of the centroids of the successive infinitesimal displacements, and the latter the corresponding locus in the plane of reference. This construction for relative motion of two plane bodies, such as parts of a machine, constrained to move in the same plane (or in parallel planes) was much employed by F. Reuleaux in his treatise mentioned below.

The corresponding proposition in three-dimensional space is that the relative motion of two rigid bodies is equivalent to the combined rolling and sliding of two ruled surfaces on each other, one being fixed in each body.

Closely connected with this is the theory of the relative displacements of a set of rigid bodies connected with one another by constraints of various kinds, and the calculation of 'degrees of freedom' of any body so connected, also the theory of 'geometrical constraints,' viz. such as are exactly sufficient to restrict the motion of a rigid body to any required extent. (Cf. Kelvin and Tait's *Natural Philosophy*, Arts. 195–202.)

A plane rigid body moving in a plane has *three* freedoms, which can be reduced to *two* by constraining one of its points to remain on a fixed curve, or to *one* by fixing one of its points. A rigid body in space has six freedoms, which might be taken as consisting of the four freedoms of a straight line (the screw-axis), the *pitch of* the screw, and the amount of rotation about the axis.

Kinematics proper, involving the idea of *time* and the derived conceptions of *velocity* and *acceleration*, both linear and angular, has several branches, according as it deals with points or rigid bodies, or non-rigid bodies, and according as one, two, three, or more dimensions of space are postulated. In one-dimensional mo-

tion of a point, if x be the distance of the moving point P from a fixed origin O, at time t, then $\frac{dx}{dt}$ measures the instantaneous speed of P, and $\frac{dx^2}{dt^2}$ its acceleration (*see* MACLAURIN'S THEOREM). Amongst the most important motions of this sort are *uniformly accelerated* and *harmonic* (simple) motions. (*See* KINETICS; HARMONIC MOTION.)

For the motion of a point in a plane (space of two dimensions) two co-ordinates, which may be the rectangulars (x, y) or the polars (r, θ), are required to specify the position of P at time t. The velocity-components in the former case are $\frac{dx}{dt}$, $\frac{dy}{dt}$ and the acceleration-components $\frac{d^2x}{dt^2}$ and $\frac{d^2y}{dt^2}$. In the latter case the velocity-components along and perpendicular to the radius vector are $\frac{dr}{dt}$ $r\frac{d\theta}{dt}$ respectively, and the acceleration-components $\frac{d^2r}{dt^2} - r\left(\frac{d\theta}{dt}\right)^2$ and $\frac{1}{r}\frac{d}{dt}\left(r^2\frac{d\theta}{dt}\right)$. The tangential and normal accelerations are $\frac{dv}{dt}$ and v^2/ρ, where v is the velocity, and ρ the radius of curvature of the path. A case of special importance is the motion of a point when the acceleration at every instant is directed towards a fixed point. In this case $r^2\frac{d\theta}{dt}$, which measures twice the rate at which the radius vector sweeps out area, is constant, a theorem which, with its converse, was stated by Newton.

The velocity and acceleration of a moving point can also be investigated geometrically by the aid of the *hodograph* (q.v.).

For motion of a point P in three-dimensional space, the usual co-ordinates for specifying the position of P at time t are (1) rectangular co-ordinates (x, y, z), or (2) polar co-ordinates (r, θ, ϕ), and here again the velocity- and acceleration-components are expressible in terms of the time-derivatives of the co-ordinates.

The motion of a plane body in a plane has been very fully treated by G. M. Minchin (*Uniplanar Kinematics*). Such motion can be specified by stating the motion of one of its points, and the rotation of the body about that point, or alternatively by determining the space and body-centrodes, and the rate at which one rolls on the other.

A construction useful in the theory of machines is the 'velocity-image' of the body at an instant. This is formed by drawing vectors from a fixed point to represent the velocities of the points of the body. The ends of these vectors form the points of another plane body, which is 'the velocity-image' of the original body, and is similar to it, but turned through 90°. The 'accleration-image, constructed in like manner, is also similar to the original body.

The motion of a rigid solid in space of three dimensions can be specified in various ways, e.g. by specifying the motion of one of its points, and its component rotations about three rectangular axes passing through that point, and either fixed in direction or fixed in the body. For other theorems in kinematics of rigid bodies *see* KINETICS.

The kinematics of bodies in non-Euclidean space, and in space of more than three dimensions, have also been investigated by modern mathematicians. The recent theory of relativity (q.v.) has important kinematic aspects.—BIBLIOGRAPHY: Kelvin and Tait, *Natural Philosophy*; G. M. Minchin, *Uniplanar Kinematics*; F. Reuleaux, *Kinematics of Machinery*; R. Willis, *Principles of Mechanism*.

KINETICS is that branch of dynamics (q.v.) which treats of the motions of bodies in connection with the forces acting upon them. The term is of recent origin, replacing the term *dynamics*, which is now used to include *statics*. An elementary account of kinetics forms part of the article DYNAMICS, and a discussion of its fundamental ideas is given in *Newton's Laws of Motion*. That part of kinetics which is independent of the ideas of mass and force is dealt with in KINEMATICS. For the kinetics of fluids (hydrokinetics) *see* HYDRODYNAMICS.

Dynamics of a Material Point or Particle. Here the fundamental equation of motion is a direct translation into symbols of Newton's second law (*see* DYNAMICS). It may be written $ma = F$, where m is the mass of the particle, a its acceleration, and F the 'absolute measure' of the force acting; and the equation implies sameness of direction as well as equality of magnitude. According to the *parallelogram of forces* (*see* STATICS), if OA and OB represent two forces acting on a particle, they are equivalent to a single force (their *resultant*) represented by the diagonal OC of the completed parallelogram OACB.

A similar 'parallelogram law' holds good for the composition of accelerations, hence if x, y, z are the rect-

angular co-ordinates of a particle referred to fixed axes, at time t, the fundamental equation gives rise to the three 'equations of motion' $m\frac{d^2x}{dt^2}=X$, $m\frac{d^2y}{dt^2}=Y$, $m\frac{d^2z}{dt^2}=Z$, where X, Y, Z are the rectangular components of F. From these equations by integration with regard to t we get $^1m(x'-x'_0)=\int_0 X\,dt$, and two similar equations, which express that the gain of momentum in any direction in a given interval of time is equal to the 'impulse' of the force in that direction. These 'impulse equations' are specially suitable for calculating the motion of the particle when 'impulsive' forces act, i.e. forces which produce a finite change of momentum in an infinitesimal time.

Again, by integration with respect to x, the equation $m\frac{d^2x}{dt^2}=X$, gives $\frac{1}{2}m(x'^2-x'^2_0)=\int X\,dx$. From this and the two corresponding equations involving y and z, by addition we get $\frac{1}{2}m(v^2-v_0^2)=\int\left(X\frac{dx}{ds}+Y\frac{dy}{ds}+Z\frac{dz}{ds}\right)ds$ $=\int F\cos\theta\,ds$, where v is the velocity of the particle, s the length of path described at time t, and F $\cos\theta$ the resolute of the force in the direction of the particle's motion. This is the *equation of work*, or energy-equation, $\frac{1}{2}mv^2$ being the kinetic energy at time t, the equation states that "increase of kinetic energy is equal to the work done on the particle by the forces acting upon it."

If we suppress the co-ordinate z (or put it $=0$), we get the corresponding theory for a particle moving in a plane. The kinetics of a particle moving in a plane can also be investigated by the aid of polar co-ordinates (r, θ). This is of special importance in the case of motion under a central force, including motion of a planet or comet, treated as a *particle*.

For a central attractive force F, which in general will be a function of r, the origin being the centre of force, the equations of motion for components along and perpendicular to the radius vector (*see* KINEMATICS) are

$$m(r''-r\theta'^2)=-F,\quad \frac{1}{r}\frac{d}{dt}(r^2\theta')=0.$$

The latter equation, being integrated, gives $r^2\theta'=h$, a constant. It is easy to show that $r^2\theta'$ is twice the measure of the rate at which area is swept over by the radius vector.

[1] Here, and throughout the article, dashes are used to indicate differentiation with respect to the time; so that x' stands for dx/dt, and x'_0 for the initial value of dx/dt.

It may be shown conversely that if $r^2\theta'$ is constant then the force on the particle is continually directed towards the centre. Again, if the particle moves in the ellipse whose polar equation is $l=r(1+e\cos\theta)$, and if $r^2\theta'=h$, we can deduce from the equations of motion that $F=\frac{h^2m}{lr^2}$, which implies that the force on the moving particle is inversely proportional to the square of the distance of the particle from the centre of attraction.

It was in this manner that Newton deduced from two of the laws of planetary motion empirically obtained from observations by Kepler, the conclusions that each planet is acted on by a force towards the sun, varying inversely with the square of its distance from the sun.

Kinetics of a System of Material Particles. Here the third law of motion affirms that all the *internal* forces in the system may be analysed into pairs of equal and opposite forces exerted on each other by pairs of particles. By combining the equations of motion of all the particles, we deduce the following results:

(i) $\Sigma(mx'')=\Sigma X$, $\Sigma(my'')=\Sigma Y$, $\Sigma(mz'')=\Sigma Z$, where X_1, Y_1, Z_1 is one of the *external* forces applied to the system. If $(\bar{x}, \bar{y}, \bar{z})$ is the centroid (q.v.) or centre of inertia, then $\bar{x}.\Sigma m=\Sigma(mx)$; and hence $\bar{x}''\Sigma m=\Sigma X$, &c., which shows that the motion of the system's centre of inertia is the same as if all the mass were concentrated at the centre of inertia and were acted on by forces equal and parallel to the actual applied forces.

(ii) $\Sigma m(yz''-zy'')=\Sigma(yZ-zY)$, which shows that the rate of change of moment of momentum about the axis OX is equal to the algebraic sum of the moments of the applied forces about this axis.

(iii) A theorem similar to (ii) holds good when the co-ordinate axes, instead of being fixed, move so that the origin is always at the centre of inertia, their directions remaining unchanged.

(iv) $\frac{1}{2}\Sigma m(x'^2+y'^2+z'^2)=\int(X\,dx+Y\,dy+Z\,dz)$ + constant. This is the equation of energy for a system of particles.

These theorems are true whether the particles are separate or combined into solid or fluid bodies. The case when they form a rigid body is of special importance. For the important case of the rotation of a rigid body about a fixed axis we deduce, (1) $I\omega'=T$, (2) $\frac{1}{2}I\omega^2=$ the integral of $T\,d\theta$, where I is the moment of inertia (*see* INERTIA, MOMENT OF) about the axis of rotation, T the torque, or

algebraic sum of moments of applied forces about that axis, ω the angular velocity, ω' the angular acceleration, and θ the angle turned through. (1) is the equation of motion, and (2) the energy equation for a rigid body rotating about a fixed axis.

It can be shown that (1) holds good not only for an axis fixed in space and in the body, but for any axis passing through its centre of inertia, and also for its instantaneous axis of rotation. When the fixed axis is horizontal and the only applied forces are gravity, and the reactions of the axis, we have the so-called 'compound pendulum' first investigated by C. Huygens.

A very general proposition in kinetics is that if for each particle we imagine a force equal and opposite to that which would be required to give it its actual acceleration supposing it were free, these fictitious forces, taken along with the actual forces on the system of particles or bodies, would satisfy the static conditions of equilibrium. (*See* STATICS.) This is *D'Alembert's Principle*, and it enables us to employ the rules of statics in writing down the equations of motion. The *centrifugal forces* on a rotating body are fictitious forces of the kind referred to.

The preceding paragraphs are confined to the simpler applications of the laws of motion to the problems of kinetics. The case of a rigid body free to move in space, and acted on by forces, presents a more complicated problem which has exercised the powers of the greatest mathematicians.

The fundamental equations referred to moving axes were given by L. Euler, and many interesting theorems have been deduced. When the body is in rotation about an axis subject to given forces or constraints, we have a *gyroscope* or *gyrostat* (q.v.).

Various axioms or principles have been put forward from time to time, to serve as the basis of dynamics, and have been applied to the study of the more general problems of kinetics. Amongst these are Maupertuis's *Principle of Least Action*; Sir W. R. Hamilton's *Principle of Varying Action*, further developed by C. G. Jacobi; and the axiom that *every natural motion of an independent material system is such that the system follows with uniform velocity one of its 'straightest' paths*, propounded by H. Hertz.

The method of generalized coordinates introduced by Lagrange is employed by most of these dynamicists. Whereas these various principles are not inconsistent with Newton's system of kinetics, the 'principle of relativity' (q.v.), recently propounded by Einstein, would, if accepted, revolutionize the whole science.—

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KINETIC THEORY OF GASES. This is a branch of the kinetic theory of matter which aims at explaining its properties by the motions of the molecules which compose it. A gas is taken to consist of a vast number of molecules flying about in all directions with various and varying velocities, the path of any one molecule being made up of straight parts connected by curved parts where the molecule is deflected by encountering another molecule, or rebounding from the wall of an enclosure. At ordinary pressures the time during which it is moving in a straight line greatly exceeds the time occupied by encounters. The impacts on the walls of the enclosure give rise to the *pressure*. The *temperature* depends on the kinetic energy of the molecules ('heat, a mode of motion').

The tendency of gases to diffuse into one another, if in contact, or separated by a porous partition, is obviously explained by this theory, as well as gaseous *viscosity* (*see* HYDRODYNAMICS), and the fact that the viscosity of a gas increases with rise of temperature.

The molecules may be supposed to attract one another when sufficiently close together. In the liquid state the molecules are so close together that in general the molecule is not moving fast enough to escape from the attraction of its neighbours, but evaporation from the free surface of a liquid is accounted for by the escape of those molecules whose velocity is exceptionally high, so as to form vapour, which is matter in the gaseous state.

Let V^2 be the arithmetic mean of the squares of the velocities of the molecules, p the pressure per unit area, and ρ the density. Then it can be shown that $p=\frac{1}{3}\rho V^2$; and, assuming that T, the absolute temperature, is proportional to V^2, then $T=kV^2$, where k is a constant for a given gas. Hence $p=\rho T/3k$. This formula expresses the experimental laws of Boyle and Charles. The law of Avogadro, which states that for a given volume, temperature, and pressure the number of molecules is the same for every gas, is also deducible from kinetic theory.

Amongst the other gaseous phenomena that can be explained by the kinetic theory are the difference

between the two specific heats of a gas, the phenomena of liquefaction, dissociation and critical temperature, the conduction of heat, and the limits of the earth's atmosphere. Since, for any gas in a given state, p and ρ can be accurately determined, the formula $p=\frac{1}{3}\rho V^2$ yields the value of V with the same degree of accuracy. Again, if N be the number of molecules in unit volume, $Nm=\rho$. Hence if N is known, m can be found, and vice versa.

There are various methods of determining these and other quantities entering into the theory of gases. The following are approximate data for hydrogen at 0° C. and 760 mm. pressure. V=1,694 metres per second. $N=2{\cdot}7\times10^{19}$ per cubic centimetre. $m=1{\cdot}66\times10^{-24}$ gm. Number of collisions of molecules per cubic centimetre per second $=1{\cdot}6\times10^{29}$ Mean length of 'free path,' $1{\cdot}4\times10^{-5}$ cm. Diameter of molecule, about $\frac{1}{300}$ of mean free path.

The kinetic theory of matter was foreshadowed by Democritus and other Greek philosophers. Gassendi and Hooke in the seventeenth century, and D. Bernoulli in the eighteenth century, made advances, but the kinetic theory of gases as we now know it is due chiefly to R. Clausius, J. Clerk Maxwell, and L. Boltzmann. —BIBLIOGRAPHY: J. H. Jeans, *Dynamical Theory of Gases*; J. Clerk Maxwell, *Theory of Heat*.

KING (O.H. Ger. *chunig, kuning*; A.Sax. *cyning, cyng*; Eng., *king*, from Goth. *chuni*, tribe), the title of a ruler who is vested with supreme authority over a tribe, a race, a nation, or a state. Generally speaking, it was force which established thrones and created kings. A lucky soldier usurped a crown and founded a dynasty. "Le premier qui fut roi, fut un soldat heureux," says Voltaire, but this lucky soldier had a natural right to rule in virtue of his superior intelligence and the services he had rendered to the community.

The first kings were individuals who had distinguished themselves from their fellow-men by virtue of their physical or mental superiority, strength, intelligence, or wealth. As their power increased, their office became hereditary in their families, although it sometimes remained elective. Kings were considered God's representatives upon earth, enjoyed divine adoration, and their persons were sacred. The royal dignity was surrounded by the halo of the divine; its power became superhuman, land became royal domain, subjects royal servants.

After Charlemagne, and especially under the feudal system, the title of king implied considerable power and sovereignty. It then followed that 'the king can do no wrong.' It was at that time that kingship became territorial instead of tribal or national, i.e. the king was the king of the land and not of the people.

Few new kings were created during the Middle Ages down to the French Revolution; but the reverse was the case during the nineteenth century, when several new kingdoms and kings arose, the latter calling themselves the kings of the people and not of the land, such as the King of the Belgians, the King of the Hellenes, &c.

In modern times, since the rise of constitutionalism, with the menace of republicanism lurking in the background, kings are neither the chief source of authority nor are they absolute, whilst their sovereign power is mostly vested in the legislative body. The latter has also a right to depose an unworthy king. At present there are no absolute kings, and since 1918 only twelve European countries have a king at all.

KING-CRAB (*Limŭlus*), a peculiar genus of animals placed in the ord. Xiphosura (sword-tailed), of the class Arachnida. They are found on the Atlantic coasts of northern and tropical America, the shores of India and Further India, the Eastern Archipelago, China, and Japan.

The head resembles a broad horse-shoe shaped shield, with two pairs of eyes upon the upper surface, the second pair being the larger and forming the true visual organs. The mouth opens on the lower surface, and around it are attached six pairs of limbs with spinous joints.

A second shield somewhat hexagonal in shape covers the abdominal part, and beneath it are the gills, or *branchiæ*, borne upon five pairs of appendages which represent the abdominal feet of the crab. The average length is about 2 feet. These crabs are destitute of swimming powers, and if placed on their backs they appear, like turtles, unable to recover their natural position.

The commonest species is the *Limŭlus polyphémus*, found chiefly on the North American coast from Maine to Yucatan. The upper surface of the tail, as in other species, bears numerous spines. *Tachypleus gigas* is common in the Malay region; *T. tridentatus* ranges from Borneo to Japan; *T. hœveni* is native to the Moluccas. *Carcinoscorpius rotundicauda* is found on the shores of India, Further India, Siam, the Moluccas, and the Philippines.

KING, Edward. English bishop. He was born 29th Dec., 1829, a son of the Archdeacon of Rochester. Educated

at Oxford, he was ordained in 1854 and served as a curate. From 1858 to 1873 he was at the Theological College at Cuddesdon, first as chaplain and then as principal. In 1873 he was chosen Professor of Pastoral Theology at Oxford and Canon of Christ Church, and from 1885 until his death, 8th March, 1910, he was Bishop of Lincoln.

King was a prominent High Churchman who exercised a great influence over the students under his care and was remarkable for his personal piety. He is chiefly known for the case in which he was prosecuted before the Archbishop of Canterbury for permitting illegal ceremonial in church. The result was the so-called Lincoln Judgment that laid down the law of the Church of England about these matters.

KING, William Lyon Mackenzie. Canadian politician. Born 17th Dec., 1874, at Berlin, Ontario, he was educated for the law. In 1900 he entered the Ministry of Labour at Ottawa, and for eight years was a civil servant. In 1908 King was elected an M.P. and from 1909–11 he was Minister of Labour under Sir Wilfrid Laurier. In 1919, on Laurier's death, he was chosen leader of the Liberal Party and in 1921 he became Prime Minister and Secretary for External Affairs. He left office early in 1926, but soon returned and was again Premier and Secretary for External Affairs, 1926–30. In 1930 his party was defeated and he resigned. Since 1926 he has sat in the House of Commons as one of the members for Saskatchewan. King attended the Imperial Conferences in 1923 and 1926. His writings are chiefly on industrial subjects, on which he is an authority.

KINGFISHER, the name of birds belonging to the family Alcedinidæ, native to most parts of the world, and allied to hornbills and hoopoes. They are distinguished by the elongated, stoutly formed bill, broad at the base, and terminating in a finely acute point; short rounded wings; short tail; strong feet, with third and fourth toes joined together.

The common kingfisher, found in Great Britain (*Alcedo ispida*), has the upper part of the head, the sides of the neck, and the coverts of the wings green, spotted with blue. The back is dark-green in colour, the lower back and rump being of a bright-blue. The throat is white, and the under surface of the body a pale brown colour.

It frequents the banks of rivers, and, perched on the bough of a tree, watches for fish. When the prey is perceived, it dives into the water, secures the fish with its beak, and carries it to land, where it kills the prey and swallows it entire. It is about 7 inches in length. This bird has been greatly celebrated in ancient poetic and legendary lore, and is the subject of many superstitions.

The American belted kingfisher (*Cerÿle alcyon*) is of a bluish-slate colour, with an iron-coloured band on the breast, whilst the head bears a crest of feathers. In the racquet-tailed kingfishers (Tanysiptera) of the East Indies, New Guinea, and the Moluccas two of the tail-feathers are narrow and elongated, with expanded tips. A large Australian species (*Dacelo gigas*) is known as the laughing-jackass (q.v.).

Kingfisher (*Alcedo ispida*)

KINGHORN, a royal burgh of Scotland, in Fifeshire, on the Firth of Forth, a favourite summer-resort and golfing-place, and once the residence of the kings of Scotland. It was made a royal burgh in the twelfth century, and had its latest charter from James VI in 1611. Pop. (1931), 2,001.

KINGLAKE, Alexander William, English historian, born 1809, died in 1891. He was educated at Eton and Cambridge, called to the Bar in 1837, but abandoned law in 1856. He first made his mark in 1844 by the publication of *Eothen*, a narrative of Eastern travel. The first volume of his *Invasion of the Crimea* appeared in 1863, and at once established his reputation as a brilliant historian; seven volumes followed at intervals, the eighth and last in 1887. The book is a monumental work, but goes too much into details of events which have now ceased to be important.

KING OSCAR LAND, district of British North America. It is the south-western part of Ellesmere Is-

land and a British possession, although named after a Swedish king.

KING OSCAR II. LAND is in the Antarctic. It lies between Weddell Sea and Bellingshausen Sea, with Graham Land to the south. It was visited and named by the Swedish explorer, Nordenskiold, in 1902.

KINGS, BOOKS OF, form two books in the English and one book in the Hebrew canon of the Old Testament. The books of *Kings* are closely connected with the first and second of *Samuel*, and, following these, form the third and fourth in what is known as 'the four books of the kingdom.' From internal evidence it would seem that these were written by a series of contemporary authorities, with additions and glosses made by a later writer.

The history in the books of *Kings* begins with the close of David's reign, and carries the events onwards to the capture of Jerusalem and the destruction of the temple. This embraces, according to the received chronology, a period of upwards of 400 years (1015–588 B.C.), and includes the history of both the kingdoms of Judah and Israel.

The chronology, however, has been much disputed. In comparing these books with the *Chronicles* it is found that while the former describe the divided kingdom of Israel and Judah, the latter are occupied almost exclusively with Judah; and further, that the books of *Kings* seem to have been compiled under prophetic, and the *Chronicles* under priestly influence.

KING'S BENCH, QUEEN'S BENCH, COURT OF, an ancient court of common law, which succeeded the *curia regis*. Formerly it was a separate court in England, and was divided into several branches for the trial of different kinds of pleas. With the Common Pleas and Exchequer it now forms the King's Bench Division of the High Court of Justice, and is presided over by the Lord Chief Justice of England. *See* SUPREME COURT OF JUDICATURE.

KINGSBRIDGE, urban district, market town and seaport of Devonshire. It stands on Salcombe Bay, 14 miles from Dartmouth and 207½ miles from London by the G.W. Rly. There is a little shipping; brewing is an industry and a fair is held here. Pop. (1931), 2,978.

Kingsbridge is the name of a bridge over the Liffey in Dublin and of the terminus of the Great Southern Rlys. nearby.

KINGSBURY, urban district of Middlesex. Between Dollis Hill and Wembley Park, it is 7 miles N.W. of London and is served by the Met. Rly. Pop. (1931), 16,636.

Another **Kingsbury** is a village in Warwickshire. It is 124 miles from London, on the L.M.S. Rly. Pop. 1,000.

KINGSCLERE, town of Hampshire. It is 9 miles from Basingstoke. Here is a famous training stable for race horses. The chief industry is brewing. Pop. 2,500.

KING'S COLLEGE, one of the colleges of Cambridge University, founded by King Henry VI in 1441. Eton College is a sister foundation, and there are very close ties between the two colleges. Until 1851 undergraduates of this college had the privilege of graduating without sitting for a university examination.

KING'S COLLEGE, London, an educational institution incorporated in 1829, reincorporated in 1882, and now an integral part of the University of London (q.v.).

KING'S COUNSEL, QUEEN'S COUNSEL, in England or Ireland barristers, and in Scotland members of the faculty of advocates, appointed counsel to the Crown, and specially sworn as such, their oath binding them to faithful service. They do not act against the Government or Crown except by special permission, which is always granted. They have precedence over other barristers, and rank among themselves according to seniority.

They are appointed by patent from the Crown on the nomination of the Lord Chancellor. They can act as judges of assize when named in the commission. It is the established etiquette that no king's counsel conducts any case without the assistance of a junior counsel.

The professional robes of king's counsel are of silk instead of stuff like those of ordinary barristers; hence the phrase 'to take silk.' The first to be appointed to the rank of queen's counsel was Sir Francis Bacon in 1604. There were 308 K.C.'s in 1921.

KING'S COUNTY, now **OFFALY,** an inland county of Leinster, Irish Free State; area, 493,637 acres. A large portion is covered by the Bog of Allen, and part of the south with the Slieve Bloom Mountains. Limestone occurs in the north-west, and has been quarried. The principal produce is oats, wheat, and potatoes, and there are breweries at Tullamore. The county town is Tullamore; Birr is next in size. Pop. (1926), 52,592.

KING'S CUP, name of a prize offered to competitors in yachting and air races. For yachting the cup is

given to the winner of a race at Cowes. For aviation it is awarded every year to the winner of an aeroplane race over a course of 700 or 750 miles. The aviation cup was instituted in 1922 and in 1930 was won for the first time by a woman, Miss Winifred Brown. In 1932 Capt. W. L. Hope won it for the third time, and in 1933 it was won by Captain de Havilland.

KINGSLEY, Charles, English clergyman, novelist, and poet, born in 1819, died in 1875. He went to school at Clifton and Helston, and when his father became rector of St. Luke's, Chelsea, studied at King's College, London, and afterwards at Magdalen College, Cambridge, where he took his degree in 1842. He now became curate of Eversley, in Hampshire, and published a poem, *The Saint's Tragedy*, and a volume of *Village Sermons*, which became popular.

This was followed in 1849 by the novel *Alton Locke*, in which his opinions of the social and economic questions of the time are powerfully expressed. Upon the same lines, but dealing with the subject from the agricultural side, followed his novel of *Yeast* in 1851.

In 1853 was published *Hypatia*, and in 1855 *Westward Ho!* both brilliant historical novels, the former dealing with the early Christian Church, the latter with the South American adventurers of the Elizabethan era. Among his other well-known works are: *Two Years Ago*; *Hereward the Wake*; *Glaucus, or the Wonders of the Shore*; *Andromeda and other Poems*; *The Water Babies*; and *At Last: a Christmas in the West Indies, the outcome of a visit.*

He was professor of modern history at Cambridge from 1860 to 1869, became canon of Chester in 1869, and of Westminster in 1873, still retaining the living of Eversley. *Charles Kingsley, his Letters and Memories of his Life*, edited by his wife, was published in 1877.

Kingsley was a great admirer of Darwin and Huxley, maintaining that science, and particularly the Darwinian theory, and theology were quite compatible.—Cf. M. Kaufmann, *Charles Kingsley: Christian Socialist and Social Reformer.*

KINGSLEY, Henry, English novelist, brother of Charles Kingsley, was born in 1830, and died in 1876. Educated at King's College, London, and Worcester College, Oxford, he left England in 1853 and went to Australia, returning in 1858. In 1859 he published his novel *Geoffrey Hamlyn*, in which he utilized his Australian experiences. Of his other novels, *Ravenshoe*, *The Hillyars and the Burtons*, and *Austin Elliott* are the best. He was for a short time editor of the *Edinburgh Daily Review*, and went out as war correspondent in the Franco-German War.

KING'S LYNN, a borough and seaport of Norfolk, England, on the Wash. One of the oldest seaports in England, it is full of historic interest. Its old guildhall contains some priceless relics. As a seaport Lynn has lost ground, partly owing to the closing of the river channels by sand. There is, however, some shipping, while fishing and rope making are other industries. Until 1918, King's Lynn, or Lynn Regis, sent one member to Parliament. Fanny Burney was born here. Pop. (1931), 20,580.

KING'S SPEECH, a document prepared by the Prime Minister and Cabinet, and read by the king from the throne in the House of Lords at the State opening of Parliament. The king drives to Westminster, and the members of the House of Commons are summoned by 'Black Rod' to attend the House of Lords to hear the speech.

It is usually divided into three parts, opening with a reference to foreign relationships, and followed by a section which is addressed only to the members of the House of Commons and deals with finance, and concluding with a review of home affairs and an invocation for "the blessing and guidance of Almighty God."

At four o'clock in the afternoon the speech is again read to both Houses, and 'an humble address is presented to His Majesty, thanking him for his most gracious speech.'

KINGSTON, William Henry Giles, novelist, was born in London in 1814, and died in 1880. He lived for many years in Oporto, where his father was in business, but settled in England in 1844, and in 1850 began the long series of boys' books for which he is chiefly famous. Among his best-known stories are: *Peter the Whaler*, *The Three Midshipmen*, *The Three Lieutenants*, *The Three Commanders*, and *The Three Admirals.*

KINGSTON, a city of Ontario, Canada, on Navy Bay, at the outlet of Lake Ontario, and connected by the Rideau Canal with Ottawa. The Queen's University was founded in 1841, and Kingston is also the seat of the Royal Military College.

The town is an important railway junction, and a service of lake steamers, as well as the canal, affords a ready means of communication by water. There are several grain elevators and flour-mills, shipbuilding-yards, and textile manufactories.

The present city, founded 1782, on the site of the old French fort of Frontenac, was the capital of Canada from 1841 to 1844. Fort Frontenac was established in 1683 by Count de Frontenac, Governor of Canada, and was destroyed by the Iroquois, but restored again in 1695. Pop. (1930), 23,439.

KINGSTON, the capital of Jamaica, on the south coast, connected by rail with the other towns of the island. It suffered immense damage in Jan., 1907, from an earthquake and consequent fire. The harbour, which is 6 miles long by 2 miles wide, is separated from the sea by a narrow slip of low land, and forms an excellent anchorage for vessels of any size. Pop. 62,707.

KINGSTON, a city of New York, United States, on the Hudson. It is

Kinkajou (*Cercoleptes caudivolvŭlus*)

united as a city with the former town of Rondout, on the Hudson and Delaware Canal, which taps the Pennsylvania coal-fields. Pop. (1930), 28,088.

KINGSTON-UPON-HULL. *See* HULL.

KINGSTON-UPON-THAMES, a borough of England, county of Surrey, on the right bank of the Thames, 12 miles from Hyde Park Corner. Its antiquity is proved by numerous Roman remains found in its vicinity, and the Saxon kings were crowned here from Edward the Elder to Ethelred II. The stone on which the kings were crowned is preserved within an iron enclosure near the market-place. It returns one member to Parliament. Pop. (1931), 39,052.

KINGSTOWN, or DUNLEARY (Irish *Dun Laoghaire*), a seaport of the Irish Free State, on the south shore of Dublin Bay. The harbour construction was begun in 1817, and completed in 1859. There are two piers, enclosing an area of 250 acres, with a depth varying from 15 to 27 feet.

Kingstown has regular mail-steamer communication with Holyhead. It is much frequented for sea-bathing, and is linked by tramway with Dublin. In 1821 George IV gave permission to change the name of the town from Dunleary to Kingstown, but the old name was resumed on the establishment of the Irish Free State. Pop. (1926), 18,992.

KINGSTOWN, capital of St. Vincent, Windward Islands, West Indies, on the south coast of that island. Pop. (1931), 4,269.

KINGUSSIE, a burgh and holiday resort in Inverness-shire, Scotland. Pop. (1931), 1,067.

KING-VULTURE, the *Gyparchus papa* of tropical America, exclusive of the West Indies. It is about 2½ feet in length, and upwards of 5 feet across the expanded wings.

KING WILLIAM'S TOWN, or **'KING,'** a town in the south-east of Cape Province, on the Buffalo River, connected by railway with the seaport East London and with the Cape railways generally. When Kaffraria was a separate colony, this town was its capital. Pop. (1921), 9,532 (5,928 white); white pop. (1931), 6,542.

KING-WOOD, a Brazilian wood believed to be derived from a leguminous tree, a species of Triptolemæa, but by some referred to *Brya ebenus*. It is beautifully streaked with violet tints, and is used in turning and small cabinet-work. Called also *Violet-wood*.

KINK'AJOU (*Cercoleptes caudivolvŭlus*), a plantigrade carnivorous mammal of northern South America, belonging to the raccoon family (Procyonidæ). In habit it is omnivorous, nocturnal, and docile when captured. In shape it resembles the lemur: the legs are short, fur close and woolly, tail long and prehensile. Being fond of honey, it makes frequent forays upon the nests of bees.

KINO, an astringent extract, resembling catechu, obtained from various trees. The original is procured from *Pterocarpus Marsupium*, a handsome East Indian tree, nat. ord. Leguminosæ, which yields a valuable timber. Kino is the juice of the tree dried without artificial heat. African or Gambia kino is obtained from another species (*P. erinaceus*), a native of tropical Western Africa.

Dhak-tree or Bengal kino is the product of *Butea frondōsa*; while Botany Bay kino is got from various species of Eucalyptus. Kino consists of tannin, gum, and extractive, and is a powerful astringent.

KINROSS', a small inland county of Scotland, west of Fife, and entirely surrounded by that county and Perthshire; area, 52,410 acres. It forms a level plain, enclosed by the Ochil Hills in the N.W., the Lomond Hills in the E., Benarty Hill in the S., and the Cleish Hills in the S.W. Loch Leven is in the centre of this plain. The geological formations are freestone, basalt, limestone, and coal in the south. Kinross-shire unites with one of the divisions of Perthshire in returning one member to Parliament. Pop. (1931), 7,454.—The small town of the same name is the county town. Pop. (1931), 2,525.

KINSALE' (Ir. *Ceann-Saile*, Head of the Brine), a seaport town and watering-place of Cork, Irish Free State. Milo de Courcy was created Baron of Kinsale in 1223, and his ancestors had the traditional privilege of remaining covered in the presence of royalty, exercised until the time of George IV. Kin(g)sale is the premier baronage of Ireland. The promontory, Old Head of Kinsale, a prominent landmark for navigators, forms one extremity of Courtmacsherry Bay, where the *Lusitania* was sunk on 7th May, 1915. Pop. (1926), 2,881.

KINTYRE, or **CANTYRE**, a peninsula, Scotland, between the Firth of Clyde and the Atlantic, forming the southern division of Argyllshire. It is 40 miles long from the Isthmus of Tarbert to the Mull of Kintyre in the south-west, and has an average breadth of about 7 miles.

KIPLING, Rudyard, British author, was born on the 30th Dec., 1865. His father was for many years curator of the Lahore Museum in India. He was educated at the United Services College, Westward Ho, North Devon, a school which he has immortalized in *Stalky and Co.* At the age of seventeen he returned to India, and became assistant editor of *The Civil and Military Gazette and Pioneer*, a Lahore paper.

In 1886 he published *Departmental Ditties*, a volume of light verse; and in 1887 *Plain Tales from the Hills*, a collection of short stories, appeared. These were followed by *Soldiers Three*, *In Black and White*, *The Phantom Rickshaw*, *Wee Willie Winkie*, and other collections of short stories. These stories are told in a masterly and highly original way, and Kipling was at once acknowledged as among the foremost writers of fiction. The soldier-stories, and the stories of children and of official life, are especially good.

After travelling in China, Japan, and America, he published a collection of sketches of travel under the title of *From Sea to Sea* (not published in book form until 1899). In 1891 he wrote his first long story, *The Light that Failed*, which has never attained the popularity of his short stories. *Barrack Room Ballads*, originally contributed to *The National Observer*, appeared in book form in 1892, and greatly increased Kipling's reputation as a writer of vigorous verse.

A fine collection of stories, *Many Inventions*, appeared in 1893; and in 1894 and 1895 appeared *The Jungle Book*, and *The Second Jungle Book*, which are considered by some critics to be Kipling's masterpieces.

Rudyard Kipling

In 1897 he published *Captains Courageous*, a tale of the Newfoundland fisheries, and in 1899 his realistic if somewhat highly coloured collection of school-stories, *Stalky and Co.* His other books include *Kim* (1901), *Just So Stories for Little Children* (1902), *Puck of Pook's Hill* (1906), *Rewards and Fairies* (1910), *A Diversity of Creatures* (1917), *The Years Between* (1918), *Letters of Travel* (1920), *The Irish Guards in the Great War* (1923), *Land and Sea Tales for Scouts and Guides* (1923), *Thy Servant a Dog* (1930), and *Limits and Renewals* (1932).

Kipling's work has always been recognized as the work of a master. He is one of the few living writers who excel in the difficult art of short story writing. His verse is vigorous and memorable; his prose is energetic and telling. Tangible recognition of his work has not been wanting. He was awarded the Nobel Prize for Litera-

ture in 1907, and is a Doctor of Letters of the Universities of Oxford, Cambridge, Edinburgh, Durham, and Paris (Nov., 1921). Some of his admirers have perhaps carried their admiration to the other side of idolatry, but Kipling must be accounted one of the most original and greatest forces in contemporary literature. — BIBLIOGRAPHY: F. L. Knowles, *A Kipling Primer*; G. F. Monkshood, *Rudyard Kipling: the Man and his Work*, and *The Less Familiar Kipling and Kiplingana*.

KIRCHHOFF (kir'hof), **Gustav Robert,** German physicist, born 1824, died 1887. He was professor of physics at Heidelberg, and afterwards at Berlin. He did important work in dynamics and mathematical physics, notably in the theories of electrical conduction, and of the elasticity of thin rods. His *Vorlesungen über mathematische Physik* is still read. The method of spectrum analysis is chiefly due to Kirchhoff and Bunsen.

KIRGHIZ (kir'gēz), a nomadic Mongol-Tartar race, numbering in its various branches about 4,500,000, and inhabiting the steppes that extend from the Lower Volga and the Caspian Sea in the west to the Altai and Tian-Shan Mountains in the east, and from the Sea of Aral and the Sir Daria in the south to the Tobol and Irtish on the north. They are divided into two main branches: the highlanders or Kara-Kirghiz, and the steppe-dwellers or Kirghiz-Kazak.

Their food is chiefly mutton and horseflesh, and their drink the nourishing fermented mare's milk called *koumiss*. They dwell in a *yurt* or semi-circular tent, the wooden framework of which is covered with cloth or felt. Their possessions are in sheep, camels, and a small hardy breed of horse.

KIRGHIZ, an autonomous Russian republic lying north and east of the Caspian Sea. The capital is Frunze. Area, 94,956 sq. miles; pop. 1,000,000.

KIRIN, a province and city of Manchuria (China). The province has an area of 105,000 sq. miles, and a population of 7,500,000, and lies in the valley of the Sungari, *the granary of Manchuria*. It produces soya beans, millet, and other cereals, and cattle, horses, sheep, and pigs are extensively bred. Kirin is called Chuen Chang (Naval Yard) by the Chinese. Between Kirin and the Pechili Gulf there is much coal. The town stands on the Sungari, and is a great centre of the lumbering industry. It is on the railroad, and has, as a consequence, a telegraph and telephone system. There are fifty *yufang* (oil-factories) in the town, and many other manufactures. Pop. 100,000.

KIRKBURTON, urban district of Yorkshire (W.R.). It is 5 miles from Huddersfield, on the L.M.S. Rly. The chief industries are woollen mills and coal mines. Pop. (1931), 3,184.

KIRKBY IN ASHFIELD, urban district of Nottinghamshire. It is a coal mining centre, on the L.M.S. and L.N.E. Rlys. Pop. (1931), 17,798.

Adjoining is **Kirkby Bentinck,** a new mining centre on the L.M.S. line.

Kirkby-in-Furness is a village a few miles from Barrow, on the L.M.S. Rly.

KIRKBY LONSDALE, market town and urban district of Westmorland. It stands on the Lune, 12 miles from Kendal, on the L.M.S. Rly. The bridge across the river dates from the 14th century. The town is the Lowton of *Jane Eyre*. Pop. (1931), 1,370.

KIRKBY MOORSIDE, market town of Yorkshire (W.R.). It stands on the Dove, 29 miles from Whitby, on the L.N.E. Rly. The town is an agricultural centre. Pop. 1,695.

KIRKBY STEPHEN, market town of Westmorland. It stands on the river Eden, 10 miles from Appleby, on the L.M.S. Rly. Agricultural fairs are held. Pop. 1,542.

KIRKCALDY (kir-ka'di), known as the 'Lang Toun,' a royal and police burgh and seaport, Scotland, county of Fife, on the north shore of the Firth of Forth. It consists principally of one long, narrow, and twisting street, which, including suburbs, extends for about 4 miles west to east, and is traversed throughout its length by a single-track tramway.

It has numerous flax-spinning mills, linen- and damask-factories, sailcloth- and net-works, roperies, and machine-factories, and the largest linoleum and floor-cloth works in the world. There is an excellent harbour, and a large shipping trade is carried on.

Kirkcaldy is the birth-place of Adam Smith (*Wealth of Nations*), and a hall bears his name (Adam Smith Memorial Hall). Here also was linoleum invented by Michael Nairn (1847), who built a factory in Kirkcaldy, and the town remains famous to the present day for its floor-cloths. Kirkcaldy sends one member to Parliament. Pop. (1931), 43,874.

KIRKCUDBRIGHT (kir-kō'bri), a maritime county of South-Western Scotland, on the Solway Firth. Area, 575,832 acres, of which about one-fourth is arable. The coast-line, generally precipitous, is considerably indented. There are extensive hilly districts; and rivers include the Dee and the Urr; and there are numerous lakes, the largest of which is Loch Ken. Granite is quarried in several

districts, while lead, copper, and iron have been found.

Kirkcudbright forms with Wigtownshire the district of Galloway, and is called the *Stewartry*. The principal towns are Kirkcudbright (the county town), Dalbeattie, and Castle-Douglas. Pop. (1931), 30,341.

The county town is a royal burgh and port on the Dee, whose charter dates from James II, 1455. It has the ruins of Bombie Castle, built in 1582 by Sir Thomas Maclellan. These ivy-covered relics stand on the main street. Dundrennan Abbey (1140) lies 4 miles from the town, but only the transept and nave are now extant. Pop. (1931), 2,311.

KIRKDALE, village of Yorkshire (W.R.). It is 8 miles from Pickering. There is a Saxon church. In a cave discovered here in 1821 have been found the fossilised bones of the rhinoceros, and other animals extinct in Great Britain. Another **Kirkdale** is a suburb of Liverpool.

KIRKE, Percy. English soldier. Born about 1645, he fought in the war against France. After serving in 1681–4 at Tangier, of which for a time he was Governor, he raised a regiment (now the Royal West Surreys) which fought at Sedgemoor, and in Ireland for William III. The men were called **Kirke's Lambs,** because of the lamb on the regimental badge, and their cruelties after Sedgemoor made these lambs notorious. Kirke died at Brussels in Oct., 1691.

KIRKHAM, urban district and market town of Lancashire. A cotton and flax manufacturing centre it is 8 miles from Preston, on the L.M.S. Rly. Pop. (1931), 4,031.

Another **Kirkham** is a village of Yorkshire (E.R.). It is on the Derwent, 16 miles from York, on the L.N.E. Rly. The remains of an abbey, now public property, include the gate-house and the cloisters.

KIRKHEATON, urban district of Yorkshire (W.R.). It is 3 miles from Huddersfield on the L.M.S. Rly. Woollen goods are manufactured. Pop. (1931), 2,610.

KIRKINTIL'LOCH, a police burgh, Scotland, county of Dumbarton, 7 miles north by east of Glasgow, with which it is connected by rail and the Forth and Clyde Canal. It is also reached by road services of omnibuses from Bishopbriggs, Glasgow. In the Peel Park are remains of the Roman Wall of Antoninus and of Comyns Castle. It has iron-foundries, chemical-works, and coal-mines. Pop. (1931), 11,817.

KIRK KILISSE, a town of Greece, 30 miles E. of Edirne. The battle of Kirk-Kilisse was fought 23rd–24th Oct., 1912, when General Dimitriev and the Bulgarian Third Army engaged three Turkish army corps under Mahmud Mukhtar. On the morning of the 24th the Turkish army was utterly routed and fell back upon the Karagach line, the Bulgars occupying Kirk-Kilisse. In May, 1913, the town was ceded by Turkey to the Balkan Allies (Treaty of London), but restored to the Turks, Sept., 1913 (Treaty of Constantinople). On 10th Aug., 1920 (Treaty of Sèvres), it was finally allotted to Greece. Pop. 17,000.

KIRKLISTON, town of Linlithgowshire. It is 9 miles from Edinburgh, on the L.N.E. Rly. The little river Almond passes it. The chief industry is distilling and oil mining. Pop. 3,974.

KIRKOSWALD, village of Cumberland. It is on the Eden, 15 miles from Carlisle. Another **Kirkoswald,** a village in Ayrshire, is associated with Burns and his Tam o' Shanter.

KIRK-SESSION, the lowest or initiatory court of the Established Church of Scotland. It consists of an ordained minister, generally the incumbent, who presides under the name of moderator, and the elders of the congregation, of whom two must be present to form a quorum. It takes cognizance of spiritual matters and of general ecclesiastical discipline within the congregation.

KIRKSTALL, suburb of Leeds. Here are the ruins of a famous 12th century Cistercian abbey. The remains include the roofless church, chapter house, refectory and other buildings. Kirkstall is on the L.M.S. Rly.

KIRKSTONE, pass in the Lake District. It is between Red Screes and Caudale Moor, and is 1,500 ft. at the top.

KIRKUK. *See* KERKUK.

KIRK'WALL, a royal and municipal burgh and seaport of Scotland, capital of the Orkney Islands, standing upon Kirkwall Bay, to the east side of the Island of Pomona or Mainland. The town is of great historical interest, and contains the Cathedral of St. Magnus, erected by Earl Ronald in 1137 to perpetuate the memory of his murdered uncle, Jarl Magnus, who was afterwards canonized, and is now patron saint of the Orkneys. The choir of the cathedral forms the parish church.

The ruins of the Bishop's Palace in which King Haco died (1263), stand beside the cathedral. There are also the ruins of the Earl's Palace (1607), which belonged to the quondam Earl of Orkney, and the remains of a

fortress of exceptional strength were cleared away to make room for an extension of the safe and ample harbour berthage. Pop. (1931), 3,517.

KIRRIEMUIR, a police burgh of Scotland, in Forfarshire. It has manufactures of coarse linens. Sir J. M. Barrie was born there, and has made the village famous as 'Thrums.' Pop. (1931), 3,326.

KIS'FALUDY, Alexander, Hungarian poet, born in 1772, died in 1844. Having entered the Austrian army as a cadet, he served in Germany and Italy. In 1801 he left the army, and employed himself almost exclusively in agriculture and in literary pursuits. His principal lyrical work, *Himfy Szerelmei* (Himfy's Love songs), gave him a first place among his native poets. He afterwards wrote the historical dramas *John Hunniades* and *Ladislaus the Cumanian.*

KISFALUDY, Charles, dramatist, brother of the preceding, born in 1788, died in 1830. Among his best comedies are *The Suitors* and *The Murderers.* Among his tragedies the best is *Irene.* He was the founder of the modern national Hungarian drama.

KISH'INEV, or **CHISINAU,** a town of Rumania, capital of Bessarabia, on the Byk, a tributary of the Dniester. In 1812 only a small town, it is now the seat of the civil and ecclesiastical authority, has many churches, schools, theatres, and large markets for cattle and corn. Kishinev was the scene of a massacre of the Jews in April, 1903. Pop. (1931), 117,016.

KISHM, or **KISSIM,** an island of Persia, at the entrance to the Persian Gulf. In 1884 it was severely damaged by an earthquake. The chief town is Tavilah or Kishm. Pop. of town, 5,000; of island, 15,000. Area of island, 500 sq. miles.

KISMA'YU, an open port, Africa, conceded by the Sultan of Zanzibar to the East Africa Company in 1899, incorporated in Kenya Colony, and ceded to Italy with Jubaland in 1925. Between Kismayu and Port Durnford there is a stretch of territory, 60 miles in length, which contains thousands of ruined buildings, and has given rise to the theory that Kenya coastal district was once very densely populated. Pop. about 4,000.

KISSINGEN (kis'ing-en), a watering-place of Bavaria, on the Saale. The springs are cold and saline, and contain a large quantity of carbonic acid gas. They are used for cardiac trouble, both internally and as baths. Pop. 9,517.

KISTNA, or **KRISHNA,** a river of India, which rises among the Western Ghâts, flows in an easterly direction, and falls into the Bay of Bengal 200 miles north of Madras; length, 800 miles.

KIT-CAT CLUB, a political club formed about 1703, and dissolved in 1720, the resort of Addison, Steele, and others, named from Christopher Cat the owner of a tavern near Temple Bar, who supplied it with pies. All the members of the Club were Whigs, and the publisher Jacob Tonson was the secretary. A *kit-cat* portrait is one rather less than half-length, from Sir Godfrey Kneller's portraits of the club members.

KITCHENER, Herbert Horatio, Baron, British soldier was born on 24th June, 1850, at Listowel, Ireland, died 5th June, 1916. His father was Colonel Kitchener, late of the 13th Dragoons and 9th Foot, and the family had migrated from Hampshire and Suffolk. The Kitchener boys were privately educated, and Herbert passed into Woolwich in 1868, leaving in Dec., 1870. He then, while waiting for his commission, spent a short time with the French army under Chanzy during the Franco-Prussian War, and was gazetted to the Royal Engineers in April, 1871.

In 1874, tiring of routine soldiering, he was permitted to accept employment under the Palestine Exploration Society. With a short interval of leave, necessitated by ill-health, he remained in Palestine till 1877, when he returned to England, via Constantinople, in order to see something of the Russo-Turkish War. His work in Palestine resulted in the publication of a complete map of the country, on which the maps used in the European War were based. From 1878 to 1882 he was employed under the Foreign Office in Cyprus and Asia Minor in survey and consular work, and in Jan., 1883, he was gazetted captain and appointed to the Egyptian army as Bimbashi and second in command of the cavalry. In this year he also made a rapid survey of the Sinai Peninsula.

During the whole of 1884 Captain Kitchener was busily employed in Egypt in connection with the Khartoum Relief Expedition, and Sir George Arthur quotes a letter from Gordon, of Nov., 1884, in which he expresses the opinion that when a governor-general should be required for the Sudan, Kitchener was the man.

Late in 1885 Kitchener, having resigned his appointment in the Egyptian army, was given a brevet lieutenant-colonelcy, and lent to the Foreign Office as representative of the Government on the joint Anglo-French-German Commission about to assemble for the delimitation of the territories of the Sultan of Zanzibar.

In 1886 he was back in Egypt as Governor-General of the Eastern Sudan, with head-quarters at Suakin, and was wounded during one of the many punitive expeditions he undertook. In 1888, being now a brevet-colonel and aide-de-camp to the queen, he was appointed adjutant-general in Cairo.

The following year he spent a few weeks' leave in India, and on his return to Egypt was charged with the duty of reorganizing the Egyptian police. On completion of this special duty, Colonel Kitchener again took up his appointment of adjutant-general, which he retained till in 1892 he was appointed Sirdar of the Egyptian Army in succession to Sir F. Grenfell. The next few years were years of hard work and reorganization, which culminated in the decisive victories of Atbara and Omdurman in 1898. For his services in Egypt Kitchener was created Baron Kitchener of Khartum and Aspall.

During 1899 Lord Kitchener was Governor-General of the Sudan. After the outbreak of the Boer War he was appointed Chief of the Staff to Lord Roberts, whom he joined at Gibraltar on 27th Dec., 1899. After being Roberts's right-hand man, and acting more as his deputy than as a chief of the staff, Lord Kitchener was, on 29th Nov., 1900, appointed Commander-in-Chief on Lord Roberts's resignation. Peace was not signed till May, 1902, and in July Lord Kitchener reached England. In October he was appointed Commander-in-Chief in India, where he arrived (via Khartum) on 28th Nov.

The greater part of 1903 was spent in an exhaustive tour of the North-West Frontier, after which he submitted his scheme for the 'Reorganization and Redistribution of the Army in India,' being "convinced that much of its existing condition cried aloud for reform." Briefly speaking, the scheme substituted two armies for the existing four commands, and made recommendations for (1) reducing garrison troops to the minimum; (2) providing a field army ready for immediate action; (3) perfecting mobilization arrangements. This scheme was sanctioned in the following year. A suggestion for the establishment of a staff college in India was also approved, and materialized in July, 1905.

On 1st Jan., 1905, Lord Kitchener issued his memorandum on the existing system of the dual control of the army in India, by which the military member of council (a soldier) had in effect the power of vetoing the recommendations of the Commander-in-Chief. Finally the Secretary of State upheld Kitchener's view that the military member was an anachronism, and that the Commander-in-Chief should be the only responsible military adviser of the Viceroy. Shortly after this Lord Curzon resigned.

At the express desire of the Secretary of State, Kitchener agreed to remain in India for an extended period, and it was not till Sept., 1909, that he handed over his command to General Sir O'Moore Creagh, V.C., and left India to fulfil an engagement entered into with the Australian and New Zealand Governments that he should advise them on the details of their proposed defence schemes. Early in 1910 he submitted a memorandum to the Governments concerned and returned to England, arriving at Plymouth in April. Shortly after his arrival he was presented by King Edward with the baton of a Field-Marshal.

In November of the same year he visited the Sudan, and from there made a journey through East Africa to Mombasa, returning to England in time for the coronation of King George. In Sept., 1911, he was appointed British agent in Egypt, which post he held till June, 1914, when he returned to England on leave, having in the meantime been created an earl. Fate, however, ordained that his much-needed period of rest should be cut short, and when, in obedience to an order that all heads of missions abroad should at once rejoin their posts, he was actually on board the steamer to return to Egypt, his last and greatest responsibility came to him. On 3rd Aug., 1914, he received a message from the Prime Minister that he was to remain in England; two days later he became Secretary of State for War.

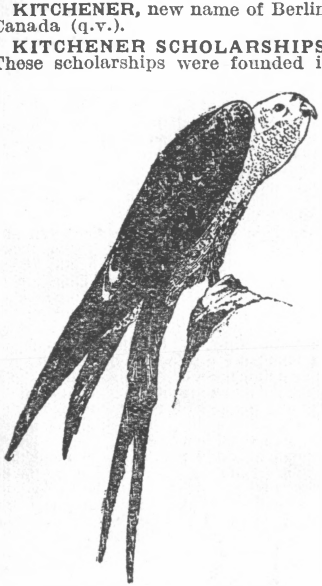
For some time prior to June, 1916, events in Russia had been unsatisfactory—largely on account of the want of arms and munitions—and it was by the express wish of the Tsar that on 5th June, 1916, a few days after he had addressed a meeting representing the House of Commons, Lord Kitchener embarked at Scapa on board H.M.S. *Hampshire*, to go to Archangel to advise with the Russian commanders on the situation on the Eastern Front. The outcome of this fatal voyage is a matter of history. (*See* EUROPEAN WAR.)

In a foreword to Sir George Arthur's *Life of Lord Kitchener*, Earl Haig writes: "We gained a respite (on the Marne). The Empire may thank God that it was given not only the respite but the man capable of taking advantage of it; the man . . . to all appearance the only one we had at this crisis in whom the nation had the trust and

confidence which made the task possible. Who can doubt that but for this man and his work Germany would have been victorious?"—BIBLIOGRAPHY: Sir George Arthur, *Life of Lord Kitchener*; Dr. S. Daiches, *Lord Kitchener and his Work in Palestine*; D. A. Mackenzie, *Lord Kitchener: the Story of his Life and Work*; E. S. Grew, &c., *Lord Kitchener*.

KITCHENER, new name of Berlin, Canada (q.v.).

KITCHENER SCHOLARSHIPS. These scholarships were founded in



Swallow-tailed Kite

1916 by the Kitchener National Memorial Fund. The original intention of the founders was to enable young men intended for a commercial career to study and gain experience in the countries of the Allied nations.

The scholarships are worth £150 a year, and were first awarded to the sons of service-men who had been killed or disabled, and to service-men under twenty-five years of age. Their scope was increased at a later date, and they now include ordinary scholarships at British universities for medical and divinity students. They were awarded to men who abandoned a university career in order to join the navy or army.

KITCHEN-MIDDENS, the name given to certain mounds, from 3 to 10 feet in height and 100 to 1,000 feet in length, found in Denmark and in different parts of Scotland. They contain relics of what is known as Maglemosian culture, which entered Europe from Western Siberia and clung to the Baltic area and Scotland. This culture dates back beyond the introduction of the Neolithic industry.

KITCHENS, COMMUNAL, opened during the European War by the Ministry of Food in London and other large towns of the United Kingdom, had for their original purpose that of supplying to the working classes, for consumption in their own homes, cooked food of wholesome quality and moderate price.

Their name, unpopular as suggesting a step in the direction of communism, was changed to that of National Kitchens; while the difficulty of keeping the food hot in transit, together with other reasons, militated against the success of the original plan, and the kitchens ultimately became restaurants, meals being served on the premises under the direction of specially trained manageresses supplied from a central headquarters in London. Many of these National Restaurants proved highly successful, being much appreciated, not only by the 'working-classes,' but by others of limited means. After the end of the European War the Ministry of Food announced the intention of closing the restaurants; but these were, in several cities, taken over and continued by the local authorities.

KITE, a bird of the falcon family, differing from the true falcons in having a somewhat long forked tail, long wings, short legs, and weak bill and talons. This last peculiarity renders it the least formidable of the birds of prey.

The common kite, glead, or glede (*Milvus ictinus*), now a rare British bird, ranges through Europe to North Africa, Syria, and Asia Minor. It preys chiefly on the smaller quadrupeds, birds, and young chickens. It usually builds in the fork of a tree in a thick wood. The pariah kite (*M. govinda*) is a well-known Indian scavenger, as is the Brahminy kite or Pondicherry eagle (*Haliastur indus*), which ranges to Australia and New Guinea. A related species, the whistling kite (*H. sphenurus*), inhabits the last two countries and also New Caledonia.

The common kite of America is the *Ictinia mississippiensis*. The awl-billed or ever-glade kite (*Rostrhamus sociabilis*), which ranges into South America from Florida and Cuba, possesses a slender hooked beak adapted to extracting snails from their shells.

KITOVO HILLS, a range of hills in Tanganyika Territory. The strong

positions constructed by the Germans in these hills, in the beginning of the European War, were captured by General Smuts in March, 1916.

KIT'S COTY HOUSE, at Aylesford, Kent, a fine specimen of a dolmen, composed of three upright stones, about 8 feet high, and a cap stone of about 11 feet in length.

KITTIWAKE, a species of gull (*Rissa tridactyla*), found in great abundance in all the northern parts of the world wherever the coast is high and rocky.

KIU-KIANG, or **KEW-KIANG,** a town and seaport of China, province of Kiangsi, on the south bank of the Yangtze Kiang. It is not an extensive commercial port, but derives importance from its connection with the green-tea districts. The port was opened to foreign trade in 1861, when the population was 10,000; in 1931, it was 80,166.

KIUNGCHOW, capital of Hainan Island, China, a treaty port since 1876. Hoi-tau is the seaport. Pop. (1931), 45,747.

KIZIL-IRMAK (the Turkish for 'Red River'), a river known to the ancients as the Halys, the principal river of Asia Minor. Rising in the Karabel Dagh, east of the town of Sivas, it flows in a circuitous route for about 520 miles, and enters the Black Sea near Sinope.

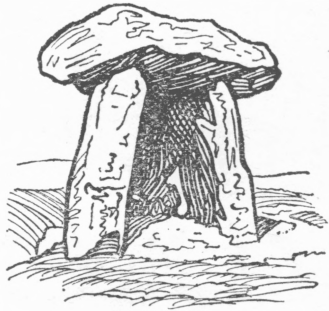
KIZIL-KUM, a sandy desert in Asia, south-east of Lake Aral, lying between the Amu Daria (Oxus) and the Syr Daria.

KLAPKA, Georg, Hungarian general, born in 1820, died in 1892. Educated in the artillery school, Vienna, he was appointed to a command in 1847. In the Hungarian Rebellion of 1848 Klapka joined the revolt as chief of the staff, and in 1849 he took command of an army corps, for a short time he was Minister for War, and then he took command at Komáron, which he defended brilliantly until he marched out on his own terms. He emigrated to Britain almost immediately, but eventually retired into Switzerland. In 1866 he organized a Hungarian division for the Prussian army, and was permitted to return to Hungary. He died at Budapest. He wrote *Memoirs of the War of Independence* (1850) and *The National War in Hungary and Transylvania.*

KLAPROTH (klȧp'rōt), **Heinrich Julius,** German Orientalist and traveller, born in 1783, died 1835. Among his numerous writings may be mentioned his *Description of the Eastern Caucasus, Description of the Russian Provinces between the Caspian and the Black Seas, Catalogue of the Chinese and Manchu Books and MSS. in the Royal Library of Berlin, Asia Polyglotta,* and *Collections of Egyptian Antiquities.*

KLAUSENBURG (klou'zĕn-bŭrh; Hun. *Kolosvár,* now called **CLUJ**), a town of Rumania, formerly belonging to Austria, capital of Transylvania. The cathedral (S. Michael) was founded by King Sigismund (1414), and the Reformed church was built by Matthias Corvinus in 1486. It had a Magyar University, founded in 1872, but a new Rumanian University was founded in 1919. Klausenburg was founded by the Romans, and was formerly walled. Pop. (1930), 96,866.

KLAUSTHAL, formerly a town of Prussia, on the Harz, the centre of an important mining district, now a suburb of Zellerfeld.



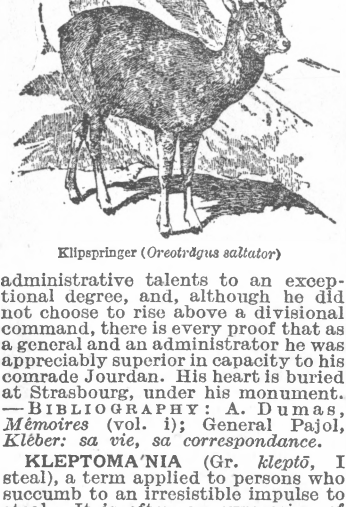
Kit's Coty House

KLÉBER (klā-bār), **Jean Baptiste,** French general, born at Strasbourg 1753, and assassinated in Cairo by a fanatic in 1800. He was the son of a mason, and studied in Paris for two years to qualify himself as an architect. During his training, however, he assisted two Austrian nobles in a tavern brawl, and was nominated, as a reward, to the Military School at Munich, from which he obtained an appointment in the Austrian army. He resigned this in 1783, and eventually joined the Revolutionary army in France (1792), where his military training gained him a commission as adjutant.

He greatly distinguished himself in the defence of Mainz, and was made brigadier-general of the army of la Vendée, in which he subsequently became general of division. In 1794 he was sent to the army of Sambre and Meuse, and greatly distinguished himself at Fleurus. Under Jourdan he directed the passage of the Rhine at Düsseldorf and the subsequent retreat.

Under Bonaparte he accompanied the army to Egypt as a general of division, and when Napoleon left, Kléber became commander-in-chief (1799). Finding his position hopeless, Kléber concluded the Convention of El Arish with the British, by which the French were to be conveyed home with arms and baggage, but Lord Keith refused to ratify the agreement, and Kléber immediately recommenced the subjugation of the country. He fell upon and slaughtered the Turks at Heliopolis, against odds of six to one, and retook Cairo, where he was assassinated.

A splendid soldier and one of the finest of the Revolutionary generals, Kléber combined both executive and



Klipspringer (*Oreotragus saltator*)

administrative talents to an exceptional degree, and, although he did not choose to rise above a divisional command, there is every proof that as a general and an administrator he was appreciably superior in capacity to his comrade Jourdan. His heart is buried at Strasbourg, under his monument. —BIBLIOGRAPHY: A. Dumas, *Mémoires* (vol. i); General Pajol, *Kléber: sa vie, sa correspondance.*

KLEPTOMA'NIA (Gr. *kleptō*, I steal), a term applied to persons who succumb to an irresistible impulse to steal. It is often an expression of some interference with the normal powers of moral control, such as may occur in persons addicted to the excessive use of alcohol or such drugs as opium and cocaine, or in those suffering from mental disorder.

In admitting the plea of kleptomania great caution is needed. The best way to arrive at a judgment is to consider the previous character and personal interests of the person charged; to determine the value and usefulness of the article appropriated; the methods of the appropriation and its probable motive. Thus when a baronet steals broken crockery, and a clergyman purloins innumerable cheap Bibles, the ordinary motives for theft are inapplicable, and when the article is taken ostentatiously, there is then a strong case in favour of kleptomania. When this is established, the person so affected must be treated as one mentally diseased.

KLERKSDORP, a town in the Transvaal, South Africa, the centre of a gold-field. It is also an important agricultural place, and has cold storage accommodation for meat. Pop. 5,668 (3,600 white).

KLINOSTAT, an instrument used in plant physiology for experiments on geotropism (q.v.); by means thereof a living plant can be rotated, continuously or intermittently, around any axis at various low rates of speed.

KLIPSPRINGER, a small South African antelope, *Oreotragus salator*, inhabiting the most inaccessible mountains of Cape Province.

KLONDIKE, a district and a river of the Yukon, North-Western Canada, the river being a tributary of the Yukon, which it joins at Dawson City, in about 64° N. and 139° W. Placer gold was discovered here in quantity in 1896, the first find being made in Bonanza Creek, and a great 'rush' immediately took place, adventurers arriving from all quarters and fortunes being made in a night, although more by the store-keepers than by the actual diggers. There are now good communications by rail and road with Dawson City (pop. 1,000), the centre of the gold-mining industry in the Yukon. *See* LYNN CANAL.

KLOPSTOCK, Friedrich Gottlieb, a celebrated German poet, born in 1724, died in 1803, famous as author of the sacred epic *The Messiah.* The first three cantos of this work were published in 1748, and excited universal attention. Klopstock was invited to Copenhagen by Count Bernstorff, and offered a small pension. In 1764 he wrote his drama *Hermanns Schlacht* (Battle of Arminius), and sent it to the Emperor Joseph, but without appreciation being shown. In 1771 he left Copenhagen for Hamburg as *hofrat* and counsellor of the *margrave* of Baden. In Hamburg he finished his *Messiah.* His work did much to free German literature from French influence.—BIBLIOGRAPHY: K. Heinemann, *Klopstocks Leben und Werke*; F. Muncker, *F. G. Klopstock.*

KLUCK, Alexander H. R. von, German general, born 1846, served in the

Austro-Prussian (1866) and Franco-Prussian (1870–1) Wars, was infantry inspector-general in 1913, and commanded the German right flank (First Army) in 1914 (European War), when Belgium was occupied and the Allies retreated from Mons. He was defeated on the Marne and on the Aisne, and retired in Oct., 1916. His book giving an account of his earlier operations, *Der Marsch auf Paris und die Marne-Schlacht*, was published in 1920.

KNAPWEED, a popular name given to some species of Centaurea. *C. Nigra*, black knapweed, and *C. scabiosa*, greater knapweed, are common weeds in Britain, being rough, hardy, herbaceous plants growing by waysides.

KNARESBOROUGH, a town of England, county of York (West Riding), on the Nidd. The environs of the town abound with objects of interest, including the ruins of the castle, founded in 1170, and dismantled in 1648; the dropping well, possessed of powerful petrifying properties; and several curious excavations. Pop. (1931), 5,942.

KNEBWORTH, village of Hertfordshire. It is 25 miles from London on the L.N.E. Rly. Here is Knebworth House, the seat of the Earl of Lytton. The estate with its extensive grounds has been in the family since about 1500. The eldest son of the Earl of Lytton is called Viscount Knebworth.

KNEE, or **KNEE-JOINT**, that joint in the lower limbs of man which corresponds to the elbow in the upper, and is formed by the articulation of the femur or thigh-bone with the tibia or large bone of the leg. The lower end of the femur terminates in two oblong rounded masses, called the *condyles* of the femur, which rest in two flat surfaces on the upper end of the tibia; interposed between the two bones are the *semilunar cartilages* which diminish the pressure of the femur on the tibia, and prevent the displacement of the former. In front of the knee-joint is the *patella* or *knee-pan*. The joint is capable of flexion and extension, and of a very slight rotatory movement.

KNELLER (nel'ér), **Sir Godfrey**, portrait-painter, born at Lübeck 8th Aug., 1646, died in London 1723. He was court painter to Charles II, James II, William III, Anne, and George I. He painted all the celebrities of the English court, and the forty-eight members of the Kit-Cat Club, and he executed portraits of ten sovereigns, including Louis XIV and Peter the Great.

KNIGHT, Charles, English editor and publisher, born 1791, died 1873. In 1823 he commenced *Knight's Quarterly Magazine*, which contained the earliest contributions to literature of Macaulay, Praed, and Derwent Coleridge. He superintended and published *The Library of Entertaining Knowledge*; *The Penny Magazine*, and *The Penny Cyclopædia*, afterwards remodelled as *The English Cyclopædia*.

Badge worn by Knights Bachelor

KNIGHT, Dame Laura, English artist. A daughter of Charles Johnson of Nottingham, she studied art first at Nottingham and later at S. Kensington. In 1903 she married a portrait painter, Harold Knight, and in the same year first exhibited at the Royal Academy.

She was elected A.R.A. in 1927, and in 1929 was made a D.B.E. Her pictures deal chiefly with theatrical subjects and circus life, of which she has made a special study.

KNIGHT, formerly a term connected with chivalry (q.v.), but now an honour conferred by the king for the recipient's lifetime, and carrying with it the privilege of the prefix *Sir*. The wife of a knight is styled *Lady*.

There are 9 different British orders of knighthood (*see* next article); a knight who does not belong to any order is known as a knight-bachelor. In 1926 a badge for knights bachelor (sword and spurs on a vermilion oval medallion) was sanctioned.

KNIGHTHOOD, ORDERS OF, the name given to organized and duly constituted bodies of knights. The orders of knighthood are of two classes—either they are associations or fraternities possessing property and rights of their own as independent bodies, or they are merely honorary associations established by sovereigns within their respective dominions.

To the former class belonged the three celebrated religious orders founded during the Crusades — Templars, Hospitallers, and Teutonic Knights. The other class, consisting of the orders merely titular, embraces most of the existing European orders. The British orders are the Garter, the Thistle, St. Patrick, the Bath, the Star of India, St. Michael and St. George, the Indian Empire, the Royal Victorian Order, and the British Empire. The Order of Merit and the Distinguished Service Order cannot be classed as orders of knighthood. The various orders have each their appropriate insignia, which generally include a badge or jewel, a collar, a ribbon of a certain colour, and a star. (*See also* previous article.) — BIBLIOGRAPHY: Sir N. H. Nicholas, *History of the Orders of Knighthood of the British Empire*; J. H. L. Archer, *Orders of Chivalry from the Original Statutes of the Various Orders of Knighthood.*

KNIGHTLOW, hill in Warwickshire. Here every year on 11th Nov., representatives of the parishes in the hundred of Knightlow meet. They stand round a hollow stone on the hill and into this throw the money due from them to the lord of the hundred. The steward of the Duke of Buccleuch calls them together and presides over the proceedings.

KNIGHTON, market town and urban district of Radnorshire. It is on the River Teme, 195 miles from London, on the L.M.S. Rly. Pop. (1931), 1,836.

Another **Knighton** is a suburb of Leicester.

KNIGHTSBRIDGE, thoroughfare in London. It runs from Hyde Park Corner to Kensington Gore. Here are Harrod's Stores, the barracks of the Household Cavalry and Prince's Club.

KNIGHT SERVICE, the original and most honourable kind of feudal land tenure. The holder of a knight's fee, the extent of which is now doubtful, was bound to render military service to his lord for forty days in every year if required. The holder of half a knight's fee attended twenty days, and the holder of smaller fractions in proportion. Knight service was abolished by 12 Charles II, cap. xxiv, freehold taking its place.

KNIGHTS HOSPITALLERS, Knights of St. John of Jerusalem, afterwards **Knights of Cyprus, Knights of Rhodes,** and lastly **Knights of Malta,** a pre-eminently military order possessing religious privileges granted by the Pope, and existing primarily for the defence of the Holy Sepulchre against infidels, and for the protection of pilgrims proceeding to Jerusalem. They originated in a Benedictine monastery which, with two hospices, was founded at Jerusalem in 1048 by some merchants of Amalfi. This monastery was dedicated to St. John the Baptist, and the monks, who were called Brothers of St. John or Hospitallers, had the duties of caring for the poor and sick and of assisting pilgrims.

In 1118 the order was regularly instituted as a military order, and lands were presented to it in both Europe and the Holy Land until it was in actual possession of over twenty thousand manors or *commanderies*, each governed by a *preceptor* subordinate only to the autocrat, the *Grand Master*. Vows of chastity, obedience, and poverty were demanded of all novices, who had also to swear allegiance to the Church and faithfulness in her defence against infidels. Brethren were divided into three classes: *knights*, who were organized for the defence of Jerusalem against the Saracens; *chaplains*, who upheld the religious traditions of the order; and *serving brethren*, who performed all menial tasks; but all classes took the vows and wore the prescribed uniform, which consisted of a long black mantle bearing an eight-pointed cross (Maltese) worked in gold and worn in war, but exchanged for a similar cloak in white in times of peace.

In 1291 Palestine was reconquered by the Saracens, and the headquarters of the Hospitallers was removed to Limasol, in Cyprus, whence, in 1310, they migrated to Rhodes, and settled there until 1522, when they yielded to the Sultan Suliman II after a long and arduous siege. The survivors retired to Candia and eventually settled in Malta, ceded to them by the Holy Roman Emperor, Charles V, in 1530, and here they remained, a bulwark of Western Europe against Turkish navies, until comparatively modern times. The island was taken by Napoleon in 1798, and the Hospitallers ceased to exist as a vital institution.—BIBLIOGRAPHY: Wodehouse, *Military Religious Orders of the Middle Ages*; Le Roulx, *Hospitaliers.*

In England the order had already been abolished (Henry VIII), while in the first year of the reign of Elizabeth all Hospitaller property had been confiscated. The Revolution

virtually extirpated all such bodies in France.

A kindred body, **The Templars,** who were suppressed in 1312, and whose property reverted thereupon to the **Knights Hospitallers,** had a similar organization, ably described in Sir Walter Scott's *Ivanhoe.*

In the nineteenth century the Hospitallers were revived as a philanthropic body, and now carry on ambulance and red-cross work under the Convention of Geneva.—Cf. J. M. Kemble, *The Knights Hospitallers in England.*

KNIGHTS OF LABOUR, a labour organization founded at Philadelphia in 1869. The association was primarily a political body; as an industrial weapon it suffered from the indiscriminate association of all classes of labour. Its membership grew rapidly after 1883, exceeding half a million in 1886, and then as rapidly dwindled, owing to the competition of the American Federation of Labour (founded 1881), which is now the body representing organized labour in the United States (and also to some extent in Canada).—Cf. W. Kirk, *Knights of Labour and the American Federation of Labour.*

KNIGHTS OF WINDSOR, POOR, a charity founded by Edward III for the benefit of twenty-six poor military men. William IV in 1833 changed the name to the Military Knights of Windsor. The Naval Knights of Windsor are supported by a bequest of Samuel Travers.

KNIPHOFIA, a genus of large South African herbs with grass-like leaves and long spikes of scarlet or yellow flowers. Several are grown as decorative plants under the name of red-hot poker or devil's poker.

KNITTING refers to the operation of making a fabric from a series of loops worked usually from a single thread which is curved upon itself and made to intersect with the loops of the preceding course of stitches. The manner in which one row of loops hang on another creates considerable elasticity of fabric, which makes it suitable for articles to be worn next the skin, as it can yield to every movement of the body and readily assumes its original position and shape.

When fashion demands coarse-gauge fabrics from thick yarns, an impetus is given to hand-knitting, but for large-scale manufacturing purposes the operation is performed on knitting-frames and machines. Modern automatic types have reached a high degree of productive capacity, and on average-size yarns one of the most recently constructed knitting-machines can give a production of nearly 1,000 yards of full width fabric in a day of nine hours, which is a rate which cannot be approached by any other type of fabric-producing mechanism.

Many knitting-machines not only produce the actual knitted material, but also give the material its size and shape, so that the actual garments are shaped on the machine except for the necessary seaming or joining together of parts to produce the finished garment ready to wear. Recent developments in knitting have been largely in the direction of producing fabric in increasing fineness of gauge, and with the improvement of the texture to give greater rigidity and firmness, it has become adaptable for almost every kind of garment.

KNOBLOCK, Edward, English dramatist. Born in New York, 7th April, 1874, Edward Knoblauch was educated at Harvard. In 1911 he achieved a notable success in London with his play *Kismet.* Another success was *Milestones,* 1912, which, like *London Life,* 1894, he produced in association with Arnold Bennett. In 1916 he was naturalized in England and changed the spelling of his name. In 1931 he dramatized *The Good Companions* in collaboration with J. B. Priestley, and *Grand Hotel* (from the novel by Vicki Baum), and in 1932 *Hatter's Castle* (from the novel by Dr. A. J. Crouin).

KNOCK, village of Co. Mayo, Irish Free State. It is 6 miles from Clanmorris.

KNOCKALOE, place in the Isle of Man. It is south of Peel, and here, during the Great War, was a large internment camp for German civilians.

KNOLLES (nōlz), or **KNOWLLES, Richard,** an English historian, born about 1545, died 1610. He was educated at Oxford, and became master of the free school of Sandwich, in Kent. He wrote a *General History of the Turks* (published in 1603 and 1610) the style of which is highly commended by Johnson, Hallam, and other critics, and *Lives and Conquests of the Ottoman Kings and Emperors,* continued to and printed in 1621.

KNOT, a complication of a thread, cord, or rope, or of two or more threads, cords, or ropes, by tying, knitting, or entangling. Knots expressly made as means of fastening differ as to form, size, and name according to their uses, as over-hand-knot, reef-knot, half-hitch, clove-hitch, timber-hitch, fisherman's-bend, carrick-bend, sheet-bend, single-wall knot, double-wall knot, &c.

The term knot is also applied on

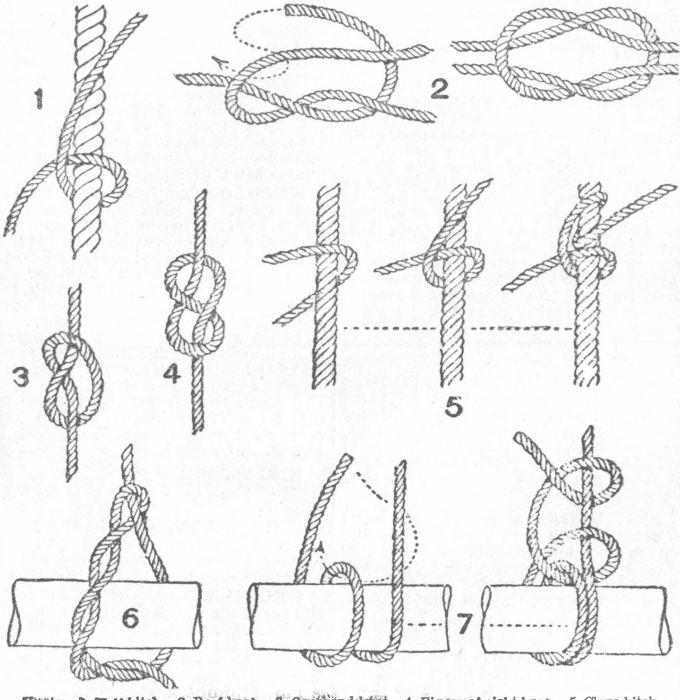
shipboard to a division of the log-line which is the same fraction of a mile as half a minute is of an hour, that is, it is the hundred and twentieth part of a nautical mile: hence, the number of knots run off the reel in half a minute shows the vessel's speed per hour in miles. When a ship makes 8 nautical miles an hour, she is said to make 8 *knots*, a nautical mile being equal to 6,080 feet.

KNOT (*Tringa canutus*), a bird of the plover family, which breeds in the Arctic regions, and is a common winter visitor to Britain.

KNOTGRASS, a very common British weed of the genus Polygonum (*P. aviculare*), remarkable for its wide distribution. It is of low growth, with branched trailing stems and knotted joints.

KNOTTINGLEY, urban district of Yorkshire (W.R.). It is 2 miles from Pontefract on the River Aire, on the L.M.S. Rly. It is a river port o the Aire and Calder navigatio system, and has some manufactures Pop. (1931), 6,842.

KNOUT, a whip similar to the cat o'-nine-tails, formerly used in Russi for the flogging of criminals an political offenders. It was withdraw from general use by ukase of Nichola I, and had been in existence fron about A.D. 1500, in the reign of Iva III. Although it existed in differen forms it consisted essentially of 16 inch strips of raw hide, plaited o otherwise, and secured to a 10-inc handle. Floggings were administere on a definite plan. On sentence th prisoner was stripped, secured to pole or frame, and received th authorized number of lashes on hi back. There was no respite and n clemency exercised in regard to th endurance of a prisoner. Flogging frequently proved fatal, about hundred lashes constituting a deat



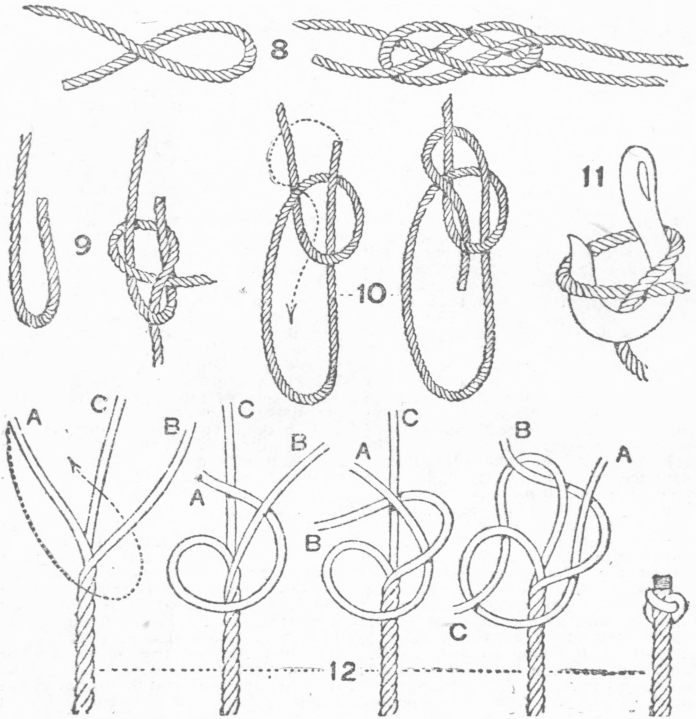
Knots. 1, Half-hitch. 2, Reef-knot. 3, Overhand-knot. 4, Figure-of-eight knot. 5, Clove-hitch. 6, Timber-hitch. 7, Fisherman's Bend

sentence. Peter the Great is said to have knouted his son to death.

KNOWLES (nōlz), **James Sheridan,** dramatist, born at Cork, 12th May, 1784, died at Torquay 30th Nov., 1862. He took to the stage in 1798, but meeting with indifferent success, he devoted himself to teaching, first in Belfast, and afterwards in Glasgow. His tragedy of *Caius Gracchus* was performed in 1815 with success, and from this time he had a prosperous career as author, actor, and lecturer. About 1845 he retired from the stage. His principal works are: *Caius Gracchus* (Belfast), 1815; *Virginius* (Glasgow), 1820; *William Tell* (Drury Lane), 1825; *The Hunchback* (Covent Garden), 1832; *The Wife of Mantua* (Covent Garden), 1833; *The Love-chase* (Haymarket), 1837; and *Love* (Covent Garden), 1839. In 1847 and 1849 he published two novels, *Fortescue* and *George Lovell.*

KNOWLTON, village of Kent. It is 10 miles from Canterbury. As the result of a newspaper competition Knowlton was awarded the prize for sending, voluntarily, the highest proportion of its male inhabitants to the Great War. A granite cross records this fact.

KNOWSLEY, residence of the Earl of Derby. It is 8 miles from Liverpool. It is a large house standing in a park of 2,500 acres and most of it dates from about 1700. The picture gallery is especially fine. The estate came to the Stanleys when, in the 14th century, one of them married the heiress of the Lathoms. In 1931 the Earl of Derby sold 1,700 acres of the estate to the Corporation of Liverpool for housing purposes.



Knots. 8, Carrick-bend. 9, Sheet-bend. 10, Bowline. 11, Midshipman's Hitch. 12, Single Wall-knot.

KNOX, John, Scottish Reformer, born near Haddington in 1513 or 1514, though some say 1505, died at Edinburgh in 1572. He was educated at the burgh school of Haddington,

and, according to Beza, at St. Andrews, where he is said to have had Dr. John Mair or Mayor as his philosophical and theological teacher, but did not take a degree. He took minor orders, and for some time acted as a public notary in East Lothian. He adopted the reformed faith about 1542–4, and entered the family of Douglas of Longniddrie as tutor to his sons and those of the laird of Ormiston.

In 1546–7 he preached to the beleaguered Protestants in the castle of St. Andrews, and when it was taken by the French, Knox was sent to France with the other prisoners, and put to the galleys, from which he was released in 1549. He passed over to England, and, arriving in London, was licensed either by Cranmer or the Protector Somerset, and appointed preacher, first at Berwick, and afterwards at Newcastle. In 1551 he was appointed chaplain to Edward VI, and preached before the king at Westminster, who recommended Cranmer to give him the living of Allhallows, in London, which Knox declined, not choosing to conform to the English liturgy. It is said that he also refused a bishopric.

On the accession of Mary, in 1554, he quitted England, and sought refuge at Geneva, where he had not long resided before he was invited by the English congregation of refugees at Frankfort-on-the-Main to become their minister. A dispute concerning the use of a church service sent him back to Geneva, whence, after a residence of a few months, he ventured, in 1555, to pay a short visit to his native country. He again retired to Geneva, where he wrote several controversial and other works, including *The First Blast of the Trumpet against the Monstrous Regiment of Women*, chiefly aimed at the cruel government of Queen Mary of England, and at the attempt of the Queen Regent of Scotland to rule without a Parliament. A *Second Blast* was to have followed; but the accession to the throne of England of Queen Elizabeth, who was expected to be friendly to the Protestant cause, forestalled it.

In May, 1559, he returned to Scotland, and immediately joined the Lords of the Congregation. He preached at Perth on the occasion when the inflamed multitude made a general attack on the churches of the city, the altars being overturned, the pictures destroyed, the images broken and the monasteries almost levelled to the ground. Similar vandalism took place in many other places, but these proceedings were censured by the reformed preachers and by the leaders of the party. Being appointed minister of Edinburgh, he took a prominent part in the proceedings of the Protestant leaders from this time onward, and had the principal share of the work in drawing up the *Confession of Faith*, which was accepted in 1560 by the Parliament. This *Confession of Faith* is known as the 'Scots Confession,' and was superseded by that of Westminster.

In 1561 the unfortunate Mary arrived in Scotland. She immediately began the regular celebration of Mass in the Royal Chapel, which, being much frequented, excited the zeal of Knox, who openly declared from the pulpit "that one Mass was more frightful to him than 10,000 armed enemies landed in any part of the realm." This freedom gave great offence, and the queen had long and angry conferences with him on that and other occasions. He preached with equal openness against the marriage of Mary and Darnley, giving so much offence that he was called before the Council and inhibited from preaching.

In the year 1567 he preached a sermon at the coronation of James VI, when Mary had been dethroned, and Murray appointed regent. After the death of Murray, in 1569, Knox retired for a time to St. Andrews. In 1572 he was greatly offended with a convention of ministers at Leith for permitting the titles of archbishop and bishop to remain during the king's minority. At this time his constitution was quite broken, and he received an additional shock by the news of the massacre of St. Bartholomew. He had, however, strength enough to preach against it, but soon after took to his bed and died.

He was buried in what was then the churchyard of St. Giles, and when the remains were laid in the grave, a contemporary uttered the following words: "Here lyeth a man who in his life never feared the face of man." Nearly three centuries later the historian Froude wrote of Knox "that no grander figure can be found, in the entire history of the Reformation in this island, than that of Knox." He was twice married, first to Marjory Bowes in 1555, and secondly, in 1564, to Margaret Stewart, daughter of Lord Ochiltree. In addition to numerous polemical tracts, letters, and sermons, Knox wrote a *Historie of the Reformation of Religion within the Realm of Scotland*. The best edition of his works is that edited by David Laing (1846–64).—BIBLIOGRAPHY: D. Buchanan, *Life and Death of John Knox*; T. M'Crie, *Life of John Knox*; P. Hume Brown, *John Knox*; T. Innes, *John Knox*; A. Lang, *John Knox and the Reformation*; D. Macmillan, *John*

Knox: a Biography; J. Stalker, *John Knox: his Ideas and Ideals*; A. R. MacEwen, *A History of the Church of Scotland*.

KNOX, Ronald Arbuthnott, English writer. Born 17th Feb., 1888, one of the four brilliant sons of Rev. E. A. Knox, Sanskrit scholar and in 1903–21 Bishop of Manchester, he was educated at Eton and Balliol College, Oxford, where he had a fine career. He became fellow and lecturer at Trinity College, and, having joined the Roman Catholic Church, was later made chaplain to the Roman Catholic students in the University. Father Knox has written a good deal of fiction as well as more serious works. His books include *The Viaduct Murder*, *Essays in Satire*, *Caliban in Grub Street*, and *The Belief of Catholics*.

Knox's eldest brother, **Edmund George Valpy Knox** (born 1881) was educated at Rugby and Corpus Christi College, Oxford. He joined the staff of *Punch*, and as Evoe became known for his humorous writings, many of which have appeared in book form as *Fancy Now, It Occurs to Me, Here's Misery* and *The Other Eden*. He succeeded Owen Seaman as Editor of *Punch* in 1933.

KNOXVILLE, city of United States, capital of Knox county, Tennessee, an important commercial and manufacturing centre at the head of steamboat navigation on the Holston River, 165 miles east of Nashville, served by the Louisville and Nashville Railroad. It contains the East Tennessee University, the Knoxville University, the State agricultural college, and other educational and literary institutions. It was settled in 1787, and became a city in 1815. Pop. (1930), 105,802.

KNUCKLEBONES, game very popular in ancient times and the forerunner of dice games. At first played with the knuckle bones of sheep, which were thrown and caught on the back of the hand, it is now played with stones, and is also known as Dibs, Fivestones, Jackstones and Chuck-stones.

KNUTSFORD, a town of England, county of Cheshire, 16 miles s.w. of Manchester. It is famous as the 'Cranford' of Mrs. Gaskell's novel, and gives name to a parliamentary division of Cheshire. Pop. (1931), 5,878.

KNUTSFORD, Viscount, English title borne by the family of Holland. Henry Thurstan Holland, a son of a physician, Sir Henry Holland, was born 3rd Aug., 1825. He went to Harrow and Trinity College, Cambridge and became a barrister. Having been for some years in the Colonial Office, he sat in the House of Commons from 1874 until 1888. In 1885 he was Financial Secretary to the Treasury; in 1886 Vice-President of the Council, and in 1888–92 Secretary for the Colonies. He was made a baron in 1888, and a viscount in 1895. He died 29th Jan., 1914.

Knutsford's son and successor, Sydney Holland, the 2nd viscount, was best known for his splendid work for the London hospitals. He was chairman of the London Hospital and devoted his life to collecting funds for its support. He died 27th July, 1931, and was succeeded by his brother, Arthur Henry Holland-Hibbert (born 1855), of Munden, Watford, as 3rd viscount.

KOALA (ko-ä'lä), the native name for an Australian marsupial belonging

Koala

to the phalanger family (Phalangeridæ). It somewhat resembles a small bear, hence its scientific name, *Phascolarctos cinereus* (Gr. *phaskōlos*, a pouch, and *arktos*, a bear). There is hardly any vestige of a tail. Its fore-feet have five toes, two of which are opposed to the other three. The koala lives in gum trees (Eucalyptus), feeding on the leaves. It is known by the names of 'native sloth' and 'native bear.'

KŌBE, third city of Japan, on the Island of Honshiu. It is the seaport of Osaka, the 'Manchester' of Japan, with which it is connected by rail (20 miles). Kōbe is on the Inland Sea, and with it is merged as a suburb the former town of Hyogo. It houses the great Kawasaki shipyards, in which a plant has been specially laid down for warship construction, and is generally a thriving industrial centre. Kōbe has cotton- and silk-factories and steelworks. Pop. (1930), 787,616.

KOBRIN, a Lithuanian town, formerly in the Russian government of Grodno, and once the capital of a

principality of the same name. Pop. 10,500.

KOCH (*koh*), **Robert,** German bacteriologist, was born at Klausthal, Hanover, in 1843, died in 1910. After studying medicine at Göttingen, he practised as a physician at Wallstein, and began the investigations that have made him one of the most famous of bacteriologists. In 1876 he succeeded in isolating the anthrax bacillus, perfecting his method of inoculation against the disease in 1883. In 1882 he discovered the bacillus of tuberculosis, and in the following year was sent by the German Government to Egypt and India for the purpose of finding the cholera germ, and this he succeeded in identifying with the so-called 'comma bacillus.'

In 1890 he announced his discovery of tuberculin, a preparation antagonistic to the tuberculosis bacillus, but it did not subsequently prove successful as a remedy. In 1905 he was commissioned by the German Government to investigate the 'sleeping sickness' in West Africa. He also undertook researches into rinderpest in South Africa, into bubonic plague in India, and into malarial fever in Italy, Greece, and elsewhere. Among his appointments were those of member of the Imperial Board of Health, professor in Berlin University, and director of the new Institute for Infectious Diseases. In 1905 he was awarded the Nobel Prize for medicine. Among his works are: *On Cholera Bacteria*; and *Diagnosis, Treatment, and Prophylaxis of Tropical Malaria.*

KOCK, Charles-Paul de, French novelist, born 1794, died 1871. He wrote an immense number of novels which had a great popularity, and have yet a certain value as pictures of low and middle-class Parisian life during the first half of the nineteenth century. Among his works are: *Georgette*; *Gustave le mauvais sujet*; *Le barbier de Paris*; *André le savoyard*; *La femme, le mari, et l'amant.* Besides his novels, he wrote some dramas, chiefly adapted from them.

KOFFYFONTEIN, a town of the Orange Free State, South Africa, 46 miles S.S.W. of Kimberley. Pop. 3,287 (1,287 white).

KOHAT', a town of India, headquarters of the district of the same name in the North-West Frontier Province. Pop., including suburbs and cantonments, 27,853.—The district has an area of 2,695 sq. miles, and a pop. of over 200,000. There are rich deposits of rock-salt, some petroleum springs, and sulphur-mines.

KOHL-RABI, a cultivated variety of the cabbage, distinguished by a swelling at the neck of the root, which is eaten, and in its qualities much resembling Swedish turnip. It is valuable as a cattle food, but is not much cultivated in Britain.

KOKRA WOOD, the wood of *Aporosa* or *Lepidostachys Roxburghii,* a tree of the Spurgewort family (Euphorbiaceæ), a native of India, used for making flutes and other musical instruments, and for general turning purposes.

KOLA, a seaport of Russia, in the government of Archangel, on the Kola, near its mouth in the Bay of Kola. It is S. of Alexandrovsk, on the Murman Railway. Pop. 649.—The **Peninsula of Kola** lies between the Arctic Ocean and the White Sea, and its northern shore is called the Murman Coast.

KOLA, or **COLA,** a genus of plants belonging to the nat. ord. Sterculiaceæ, a native of Western Tropical Africa. The *Kola* or *Cola acuminăta* produces a fruit which consists of two, sometimes more, separate pods containing several seeds about the size of horse-chestnuts. The seeds have been found to contain caffeine, the active principle of coffee, as also the same active principle as cocoa with less fatty matter. A drink prepared from them is largely used in tropical Africa, and is said to have digestive, refreshing and invigorating properties. The tree has been introduced into the West Indies and Brazil. The negroes of Jamaica are said to get quickly rid of the effects of intoxication by using the kola-nut.

KOLAR', a district of the native state of Mysore, Southern India; area, 3,165 sq. miles; pop. 731,500. There are productive gold-mines (Mysore, Ooregum, &c.).—The capital, **Kolar,** is situated 43 miles E.N.E. of Bangalore. Pop. 8,200. Kolar Gold Fields forms a municipality; pop. 48,000.

KOLDING, a seaport of Denmark, east coast of Jutland, on the Koldingfjord, an inlet of the Little Belt. The battle of Kolding, between the Danes and the insurgents of Schleswig-Holstein, was fought in 1849. Pop. 22,959.

KOLHAPUR (kol-hä-pör'), a native Indian state, Bombay Presidency, under a rajah; area, 3,217 sq. miles; pop. 883,441.—**Kolhapur,** the chief town, is a picturesque, thriving place, venerated for the antiquity of its sacred shrines. Pop. 55,594.

KOLLIN, or **KOLIN,** a town of Bohemia, Czechoslovakia, on the Elbe, 35 miles east by south of Prague. It has manufactures of sugar, chemicals,

&c. Frederick the Great was defeated here by Marshal Daun, 18th June, 1757. Pop. 16,000.

KOLOME'A, or **KOLOMYJA**, a town and important railway junction of Turkey in Eastern Galicia, 108 miles S.S.E. of Lemberg, on the right bank of the Pruth. Petroleum refining and pottery occupy the inhabitants. The scene of heavy fighting during the European War, the town was several times captured and recaptured by the Russians and the Austrians respectively. Pop. (1931), 33,385.

KOLOM'NA, a town of Russia, in the government of and 60 miles south-east of Moscow. Pop. 45,371.

KOLOZSVAR. *See* KLAUSENBURG.

KOLTCHAK, V. V., Russian admiral and administrator, born 1875, died 1920. He joined the Russian navy in 1891, and was at Port Arthur (1904–5). In 1916 he was vice-admiral of the Black Sea fleet, and was arrested by mutineers and imprisoned during the Revolution of 1917. During 1917 he organized military forces, and in 1918 he set up a Royalist Government at Omsk and marched upon the Urals, where he won several battles against the Red troops. Eventually he was captured and shot by the Reds at Irkutsk, 7th Feb., 1920.

KOLUBARA, river of Yugoslavia. It rises near Valievo and flows mainly north to the Save. In Nov. and Dec., 1914, a battle was fought along its banks between the Austrians, who had invaded Serbia, and the Serbians. It lasted nearly a month, but in the end the Austrians were driven out.

KOLYVAN', a town of Western Siberia, in the government of Tomsk, near the left bank of the River Ob. Pop. 12,000.

KOMINTERN, THE. Third, or Communist, International. It is the international organization of the Communist party of all nations, and was founded in March, 1919. Its chief purpose is to hasten world revolution, and it rejects parliamentarism as a means to this end. It is an association bound together by a common programme and principles. It organizes "cells," which work in different places, to the common end, and are subordinated to the party as a whole.

KOMORN', or **KOMARNO**, a town of Czechoslovakia, formerly in Hungary, at the confluence of the Danube and Waag, with some manufactures and a considerable trade. There is here a very strong fortress which has been repeatedly besieged. During the Hungarian insurrection of 1848–9 it was besieged by the Austrians and eventually capitulated. Pop. (1930), 21,137.

KONAKRY, a seaport on the west coast of Africa, Island of Tombo, and capital of French Guinea. It is on the Kurussa-Kankan railway to the Niger. Pop. 8,500.

KONG, a name formerly given to a non-existent West African mountain range, now recognized as a plateau having several isolated peaks, some about 5,000 feet high.

KONG, a district and town in the French Ivory Coast Colony, West Africa. District pop. about 47,000.

KONGOLO, a town of Belgian Congo, on Lualaba (name given to Upper Congo) River. It is in communication by rail and telegraph with Kindu (220 miles), and possesses a wireless station.

KÖNIGGRÄTZ (*keu'nih grāts*), a town of Bohemia, Czechoslovakia, at the confluence of the Adler and Elbe. It is the see of a bishop, and has a (Gothic) cathedral, founded in 1302, and dedicated to the Holy Ghost. The battle of Königgrätz or Sadowa was fought on 3rd July, 1866, between the Austrians and Prussians, the former being totally defeated. This was the deciding battle of the Austro-Prussian War. Pop. 13,100.

KÖNIGINHOF (*keu'ni-gin-hof*), now **DVUR KRÁLOVÉ**, a town of Bohemia, Czechoslovakia, on the Elbe, where the *Königinhof Manuscript* of Czech national songs was unearthed in 1817. The Hussites attempted to take the town in 1421. Pop. 15,050.

KÖNIGSBERG, a seaport town of Germany, capital of East Prussia, on the Pregel. It consists of three main parts—the **Alstadt** (old town), **Löbenicht**, and **Kneiphof**—situated on an island formed by the Pregel, besides extensive suburbs south of the river. An ornamental lake, covering 12 acres, lies between the Alstadt and Löbenicht. The principal public buildings are the fourteenth century cathedral, restored in 1856, situated on the Kneiphof; the *Schloss*, begun in 1255, and formerly the residence of the Grand Masters of the Teutonic Order; the *Schlosskirche*, occupying a wing of the palace; the university, completed in 1862; the old university, founded in 1544 and attended in 1914 by 1,700 students, having a library of 320,000 volumes, a zoological museum, and an observatory. Kant was a native of the town, and a bronze monument perpetuates his memory.

History. Königsberg entered the Hanseatic League in 1340, suffered much during the Seven Years' War by the occupation of the Russians from

1758 to 1764, and much more severely from the French, who entered it in 1807 after the battle of Friedland. Before the European War the town was a fortress of the first rank, and was almost occupied by the Russians in their advance in 1914. It has a broadcasting station (217 m., 0·5 wk). Pop. 287,312.

KÖNIGSHÜTTE. *See* KROLEWSKA HUTA.

KONKAN, the narrow coast-strip along the southern portion of Bombay

Königsberg, The Royal Castle

Presidency, between the Western Ghâts and the sea. It includes the town and Island of Bombay, several small native states, and the Portuguese territory of Goa. Area, about 17,000 sq. miles; pop. 3,806,497.

KO'NYA, or **KONIEH** (ancient **ICONIUM**), a town in Anatolia, capital of a vilayet of the same name on an extensive plain; with industries and trade in carpets and silks. It is connected with the Bosporus (Istanbul) and with Smyrna (Izmir) by railway, and is the starting place of the Baghdad railway. Iconium was the capital of Lycaonia. (*See* ACTS xiv, 1–21, &c.) Pop. 47,495.

KOODOO, or **KUDA** (native name), the striped antelope (*Strepsicĕros kudu*), a native of South Africa, the male of which is distinguished by its fine horns, which are nearly 4 feet long, and beautifully twisted in a wide spiral. The koodoo is of a greyish-brown colour with a narrow white stripe along the back, and eight or ten similar stripes proceeding from it down either side. It is about 4 feet in height, and fully 8 feet in length.

KOO'TENAY, a river of the United States and Canada, which rises in the Rocky Mountains, passes through Montana and Idaho, flows through Lake Kootenay, afterwards joining the Columbia River. Considerable deposits of gold have been found in its basin. Length, 400 miles.

KOPECK, Russian coin. It is the hundredth part of a rouble, or nominally something less than a halfpenny.

KOPENICK, town of Prussia. It is on an island in the Spree, 10 miles from Berlin. Pop. 31,000.

The **Captain of Kopenick** was a cobbler, Wilhelm Voigt. In Oct., 1906, he dressed himself as an army officer, and with an imposing guard, pretended he had come on important business to the burgomaster. He thus obtained a good deal of money, but was soon arrested. He died in 1918.

KOPJE, Dutch name for the flat round-topped elevations that are scattered over the tablelands of S. Africa. In the Great Karroo and else-

Kudoos or Kudus

where compact lava-sheets of geological age have been weathered and fretted into hillocks up to 100 ft. high. They greatly influenced operations in the S. African War, 1899–1902.

KO'RAN (*Al-Korân*, that is, *the Koran*, or *Quran*, which means originally 'the reading, or that which is to be read,' from the Ar. *Qŏr'ă'ă*, to read, to recite), the book containing the religious and moral code of the Mahommedans, and by which, indeed, all their transactions, civil, legal, mili-

ary, &c., are regulated. It is thus the foundation of Islam, and the final authority in everything relating to the life of a Moslem.

The **Koran** is also called **Alkitáb,** the Book; **Kitabul-lâh,** The Book of God; and **Al-tanzil,** The Revelation. According to the Mahommedan belief it is coeval with God, uncreated, eternal, and its first transcript was written from the beginning in golden rays on a gigantic tablet in the highest heavens, and portions were communicated by the angel Gabriel to Mahomet at intervals during twenty-three years. These were dictated by Mahomet to a scribe and kept for the use of his followers.

After Mahomet's death they were collected into a volume by Zaid Ibn Thabit, Mahomet's disciple, at the command of Abu Bekr, Mahomet's father-in-law and successor. This form of the **Koran,** however, was considered to contain erroneous readings, and in order to remove these Caliph Othman caused a new copy to be made from the original fragments in the thirtieth year of the Hegira (A.D. 652), and then ordered the destruction of all the old copies. One copy of the new edition was kept at Medina, and one was sent to each of the chief cities of Islam—Basra, Kufa, and Damascus. These were the only authentic MSS., and all other editions were merely copies.

The leading doctrine of the **Koran** is the Oneness of God, clearly laid down in the passage: "Say, God is one God; the Eternal God; He begetteth not, neither is He begotten; and there is no one like unto Him," which is said to have been revealed in answer to a question of the Kuraish concerning the attributes of the God of Mahomet. To Christ it assigns a place in the seventh or highest heaven, in the immediate presence of God, but he is simply regarded as one of the prophets—Adam, Noah, Abraham, Moses, Jesus, and Mahomet.

The doctrines of good and bad angels, and of the resurrection and final judgment, are fully set forth, as is also God's mercy, which secures entrance into heaven and not the merits or good works of a man. The joys of heaven range from music and women (*houris,* q.v.) to the supreme joy of beholding God's face, while the pains of hell are depicted in vivid colours. Idolatry and the deification of created beings are severely condemned. Another dogma is set forth in the **Koran,** yet not explicitly, that of the unchangeable decrees of God. Mahomet used the doctrine of predestination with great success to infuse into his adherents undaunted courage, which elevated them above all perils.

The **Koran** prescribes prayer five times a day with the face turned towards the Kaaba, fasting, alms, and the pilgrimage to Mecca and the Hill of Arafat. Purification in running water, after a certain manner which is laid down, must precede prayer, and where water is unattainable dry dust or sand may be used, or even clay where the believer is wounded or sore. The prayer in most general use by Moslems is the *Fatihah,* which runs: "In the name of God, the Lord of the Worlds; the Compassionate; the Merciful; the King of the Day of Judgment. Thee do we worship and of Thee do we seek help. Lead us in the right way; the way of those to whom Thou hast been gracious, who have not incurred Thy wrath, and who go not astray." This is universally used as one of, or in addition to, the five prescribed prayers, and is equivalent to the Lord's Prayer of the Christian peoples.

To give alms was always a particular trait of the Arabians, but Mahomet made it obligatory. In respect to the civil laws relating to polygamy, divorce, inheritance, &c., Mahomet followed step for step the laws of Moses and the decisions of the rabbis, only adapting them to the customs and prejudices of his countrymen.

The **Koran** is written in prose, but the different parts of a sentence end in rhymes. In size it is about equal to the New Testament; it is divided into 30 *juzans,* subdivided into 114 *súrās* or chapters, which are separated by the phrase, "In the name of God," which forms the opening phrase of each *súrā.* The *súrās* are not arranged in chronological order, but deal with single subjects or parts of a subject. As the work was written at different times, in different moods, and on different occasions, there is naturally great diversity in the style of different passages. The language is considered the purest Arabic.—BIBLIOGRAPHY: J. M. Rodwell, *Koran* (translation in Everyman's Library); E. Sell, *Historical Development of the Quran*; W. Muir, *The Coran: its Composition and Teaching*; H. Hirschfeld, *New Researches into the Composition and Exegesis of the Qoran*; W. St. Clair Tisdale, *The Original Sources of the Quran.*

KORDOFAN', a province of the Anglo-Egyptian Sudan. From 1821 to 1883 it formed one of the Sudanese provinces of Egypt, but at the latter date it was freed from Egyptian rule through the Mahdi's insurrection. It was recovered in Jan., 1884, and the Egyptian administration was again resumed in 1889. The surface is generally flat and the soil naturally fertile. The climate in the wet season, lasting from June to October, is extremely unhealthy; in the dry season,

though healthy, it is intolerably hot. The principal articles of trade are gum, hides, senna, ivory, cattle, gold, salt, slaves, &c. Cultivation is almost wholly confined to *duchn*, a species of millet. The inhabitants are of many nations, but they all speak Arabic. Area, 130,000 sq. miles; pop. 671,000.

KOREA. *See* COREA.

KÖRNER (keur'nĕr), **Karl Theodor,** German poet, born at Dresden 1791, killed 1813. He wrote the tragedies of *Rosamunde* and *Zriny*, and a large number of dramas for the Theatre Royal at Vienna, but owes his fame to his celebrated patriotic lyrics. In 1813, when Germany took up arms against Napoleon, Körner joined the famous Lutzow corps of black hussars, and was fatally wounded in a skirmish near Gadebusch, in Mecklenburg-Schwerin. The collection of songs published soon after his death as *Leier und Schwert* (Lyre and Sword) contains some of the finest war-songs in any language.

KORNILOV, Lavr Georgievitch, Russian general, born 1870, died 1918. The son of a Cossack officer, he was educated at the Military Academy, St. Petersburg (Petrograd—Leningrad), and subsequently travelled extensively. He is reputed to have served with the Boers during the Boer War, but repeatedly denied this, and explained that he was then in North-West India on behalf of the Russian Secret Service.

He served in the Russo-Japanese War (1904–5), and was captured by the Austrians in 1914 (European War). On his escape from Austria he was made military Governor of Petrograd during the Revolution; was in conflict with Kerensky, dismissed from the High Command, and imprisoned Sept., 1917). On the fall of Kerensky he organized the Kuban Cossacks, and was killed at Ekaterinodar (March, 1918) by a shell bursting over the house from which he directed the anti-Bolshevik campaign.

KOSCIUSKO, Tadeusz, Polish patriot, was born in Lithuania, of an ancient and noble family, 12th Feb., 1746, and died at Soleure (Solothurn) 15th Oct., 1817. He went to America in 1777, where he attracted the notice of Washington, was appointed by him engineer, with the rank of colonel, and afterwards general of brigade. He did not return to Europe till three years after the conclusion of the Peace of 1783. For some years after his return he lived in retirement, but after serving in his own country under Poniatovski, he was appointed in 1794 generalissimo of the insurgent forces. He defeated the Russians at Raclavice, near Cracow, but at the battle of Macziewice (10th Oct., 1794) his army was defeated and he himself wounded and taken prisoner. He remained in captivity for two years, but was liberated on the accession of Paul of Russia in 1796.

After visiting England, America and France, he ultimately settled at Soleure, in Switzerland, where he continued to live in quiet retirement. In 1817 he issued from there a letter of emancipation to the serfs on his estate in Poland. In 1818 his body was removed at the expense of the Emperor Alexander of Russia to Cracow, where it was buried in the cathedral, and where a monument was erected to him. A mound 150 feet in height, formed of earth from all the principal battlefields of Poland was also raised to his memory in the vicinity of Cracow.—BIBLIOGRAPHY: L. J. B. Chodzko, *Biographie du Général Kosciuszko*; Monica M. Gardner, *Kosciuszko: a Biography*.

KOSCIUSKO, MOUNT, New South Wales, the highest mountain in Australia (7,328 feet), in the northern Australian Alps; it has a meteorological station.

KOSEL, or **COSEL,** a fortress town of Silesia, on the Oder. It was besieged on four occasions between 1758–62, and again harassed in 1807. Pop. *c.* 8,000.

KOSHER, or **KASHER,** a Hebrew word meaning proper and fit. It is rarely used in the Bible (*Esther*, viii, 5). The word is especially applied to food, and particularly meat, which is considered proper to be eaten by orthodox Jews, such as meat of clean animals killed in accordance with rabbinical law.

KOSICE, a city in East Slovakia, Czechoslovakia, 130 miles N.E. of Budapest. Pop. (1930), 70,232.

KÖSLIN (keus'lin), a town in Prussia, province of Pomerania, 7 miles from the Baltic, and 85 miles north-east of Stettin. It has manufactures of paper, soap, bricks, and mineral waters. Pop. 28,334.

KOSLOV, KOZLOV, or **EUPATORIA,** a seaport, South Russia, in the Crimea. It manufactures soap and leather, and has some grain, wool, and salt trade. The annual fairs are held at the famous Troitzki monastery close by. Pop. 54,390.

KOSSUTH (kosh'shut), **Lajos** (Louis), Hungarian patriot, born at Monok, in the county of Zemplin, Hungary, 1802, died in 1894. He studied law, and in 1832 sat in the Pressburg National Diet. For persisting in publishing the debates of the Diet, he was condemned to four years' imprisonment (1837–40).

In 1841 he became editor of the *Pesth Journal*, and in 1844 he founded a national league in opposition to the Viennese Government. In 1847 he was elected to the Diet by the National party, and secured the appointment of a responsible Hungarian ministry, in which he became Minister of Finance.

During the Hungarian war for liberty he was chosen Governor or Dictator, but the intervention of Russia rendered all the efforts of the Hungarians unavailing. Kossuth resigned, was succeeded by Görgey (whom he accused of treachery), and was interned in Turkey (1849). He was released through the intervention of Britain and the United States; visited these countries and met with an enthusiastic reception. He was long regarded as the leader of the Irreconcilable party, but in 1884 he became reconciled to the Habsburg rule. His chief residence in his latter years was at Turin, where he died.—Cf. W. R. Thayer, *Kossuth* (in *Throne Makers*).

KOSTROMA', an inland government of Russia; area, 32,432 sq. miles. Hemp and flax are largely grown, and the industries include the manufacture of silver and copper wares, leather, and chemicals. The forests are extensive. Pop. 811,615.

KOSTROMA, the capital of the government of the same name, stands on a height near the confluence of the Kostroma with the Volga, 66 miles east of Jaroslav. It is an ancient place, and has a fine old cathedral situated on the Kreml or former citadel. Kostroma university was established in 1919. It was at Kostroma that Michael, the first ruler of the House of Romanov, was elected Tsar in 1613. Pop. 73,730.

KOTAH, an Indian native state in Rájputána, under the political superintendence of a British agent. Area, 5,684 sq. miles; pop. 630,060.—Kotah, the chief town, is situated on the River Chambal, and has a pop. of 31,707.

KOTTBUS, or **COTTBUS**, a town of Germany in the Prussian province of Brandenburg, on the Spree, 70 miles S.E. of Berlin. It is a busy manufacturing town. The chief manufactures are cloth yarns, linen, hosiery, tobaccos, toys, wool, and carpets. There are also breweries. Pop. 50,600.

KOTZEBUE (kot'ze-bö), **August Friedrich Ferdinand von**, a German dramatist, born at Weimar 1761, assassinated at Mannheim 1819. He wrote more than a hundred plays, a *History of Germany*, and other works, most of which are now forgotten. Two of his plays, *The Stranger* and *Die Spanier in Peru*, the latter adapted by Sheridan as *Pizarro*, used to be well known on the British stage.—Cf. Charles Rabany, *Kotzebue: sa vie, son temps, et ses œuvres*.

KOUMISS, milk which has undergone alcoholic fermentation. It has a frothy appearance, and tastes somewhat like old buttermilk; the casein being present in the form of a very fine floating coagulum. Koumiss was originally prepared in the steppes of Southern Russia, and is made from mares' milk, although skimmed cows' milk is generally used in Britain. It is valuable as a diuretic and as a body-builder, but good koumiss should not contain more than 2 per cent alcohol and 1 per cent lactic acid. *See* YOGHURT.

KOVNO, now **KAUNAS**, a town in Lithuania, the seat of the Government, 60 miles W.N.W. of Vilna, on the left bank of the Niemen or Memel. During the European War Kovno was captured by the Germans, under Eichhorn, on 17th Aug., 1915. The population, a great part of which consists of Jews, is 113,000.—The district of **Kovno** has an area of 15,500 sq. miles, and its population is 1,871,400.

KOWLOON, a peninsula at the mouth of the Canton River, China, belonging to the British Crown Colony of Hongkong (q.v.).

KRAAL, collection of huts around a cattle enclosure. It is sometimes stockaded with timber fences or mud walls. Kraals are built by the Kaffirs and Hottentots and the word is also used for similar villages in E. Africa, and sometimes for enclosures for animals.

KRAGUJE'VAC, a town of Serbia, Yugoslavia, on the Lepenitza, with a cannon and small-arms factory, powder-mill, and arsenal. Pop. 27,249.

KRAKATO'A, a small uninhabited volcanic island situated in the Sunda Straits, about equally distant from Java and Sumatra. Previous to the eruption of 1883 it measured 5 miles in length and 3 miles in breadth, and culminated in two elevations, the highest of which was known as the Peak of Krakatoa, and rose to a height of some 2,750 feet above the sea-level.

Krakatoa was the scene of an eruption in 1680, but from that time its history was uneventful till the eruption of 1883. In May of that year all the premonitory symptoms of activity were observed, and on 27th Aug. a gigantic explosion took place which actually blew up two-thirds of Kraka-

toa, and entirely altered the physical features of the island and the neighbouring coasts. An immense wave swept over the shores of the neighbouring islands, occasioning a loss of life estimated at 36,000. To the north two new islands appeared where prior to the eruption there had been from 30 to 40 fathoms of water. The sound of the explosions was heard over a vast area, as far away as Rodriguez (nearly 3,000 miles) and Ceylon (2,058 miles). Some of the dust caused by the explosions came into the higher layers of the atmosphere, and gave rise to beautiful sunsets for many weeks afterwards.

KRAKEN, fabulous sea monster of Scandinavian legend. Supposed to be of enormous size, it has been likened by an old Norwegian writer to an island appearing in the water with arm-like appendages resembling those of an octopus. It is the subject of one of Tennyson's early poems.

Kreutzer

KRAN, Persian coin. The monetary unit of the country, it is coined in silver and worth about 4*d*. Ten krans make a toman.

KRASNOIARSK' (the Town on the Red Cliff), a town in Siberia, 180 miles south of Yeniesisk, at the junction of the Yenisei and Katcha. Manufactures of leather are carried on, and there are also some gold-washings in the neighbourhood. Pop. 87,500.

KRASNOVODSK', a Russian seaport on the eastern shore of the Caspian Sea. It is the starting-point of the railway to Merv, Samarqand, &c. Pop. 10,000.

KRASSIN, Leonid Borisovitch. Russian revolutionary. Born in 1870, he entered business life, but becoming associated with the extremists was, for a time, an exile. He had returned to Russia when the revolution began in 1917, and as one of its leaders he helped to arrange the Treaty of Brest-Litovsk, and became a minister in the new government. In 1920, and again in 1921, he was sent on a trade mission to England, and he represented the Soviet Government in London in 1925–26. He died in London, 24th Nov., 1926.

KREFELD (krā'felt), or **CREFELD,** a town in Rhenish Prussia, in the government of Düsseldorf. It is the principal locality in Prussia for the manufacture of silks, velvets, and mixed silk goods. There are also manufactories of woollen, linen, and cotton cloth, wax-cloth, hosiery, soap, candles, paper, leather, chemical products, and tobacco. Pop. 159,064.

KREISLER, Fritz. Austrian violinist. Born in Vienna, 2nd Feb., 1875, he studied in Vienna and Paris, and soon showed exceptional powers. He toured the United States in 1889, and first appeared in London in 1903. He served in the Austrian Army during the Great War and was wounded. He has since made several appearances in London, being regarded as the world's greatest violinist.

KREMLIN, Russian word for a citadel. The most famous is the kremlin at Moscow. It stands on a hill over-looking the river Moskva and covers about 100 acres, the whole being surrounded by a wall.

KREMS, a town of Lower Austria, at the confluence of the Krems and Danube, in a fertile wine-growing district. It is separated from the town of Stein by the suppressed Capuchin monastery of Una. Pop. 12,800.

KREM'SIER, a town of Czechoslovakia, in Moravia, on the March. It contains a palace of the Prince-Bishop of Olmütz and a library of 25,000 volumes. Pop. 16,528.

KREUGER, Ivar, great Swedish industrialist, was born in 1880. Before the Great War he worked in the U.S.A., Mexico, and S. Africa. Returning to Sweden he engaged in the match business and in 1917 brought about a nation-wide amalgamation known as the Swedish Match Company. The firm of which Kreuger was head, manufactures the bulk of the world's matches. He died in 1932.

KREUTZER, or **KREUZER** (kroit'sèr), an old German and Austrian coin. The German kreuzer was equal to the sixtieth part of the gulden or florin, or about a third of a penny. The Austrian coin bearing this name was the hundredth part of a florin, or equivalent to one-fifth of an English penny.

KREUZNACH (kroits'nâh), a town in Rhenish Prussia, district of Coblenz, on the Nahe, 21 miles south-west of Mayence. There are valuable mineral springs containing bromine and iodine, which are much resorted to for their curative properties in scrofulous and other complaints. Marble-polishing, wine-growing, and the manufacture of leather are among the chief industries. Pop. 23,000.

KRIEGSPIEL (krēh'spēl; War-game), a game of German origin, played with maps on a large scale, and coloured metal blocks, on the same scale as the map, representing bodies of troops of various strengths (brigades of infantry, regiments of cavalry, besides artillery, engineers, and administrative troops). The players are usually two on each side, and the game forms an exact miniature of tactical operations. It is played by alternate moves. Each move represents the lapse of two minutes, and rules are given to determine the distance that each branch of the service may move over in that time. When two bodies of men on opposite sides come into contact, the weaker in numbers and position is held to be defeated; but when they are equal in these respects, victory is determined to one side or the other by the use of a die. The game was a favourite one in the German army.

KRIS, dagger used by the Malays. It has usually a sinuous blade. The handle is commonly of wood, but some examples are of ivory, with a decorated scabbard.

KRISHNA, in Hindu mythology, the eighth avatar of Vishnu and the most popular deity in the Hindu pantheon. The identity of Vishnu (q.v.) and Krishna is generally acknowledged in the *Mahabharata* (q.v.), *Harivamsa,* and the *Purānas,* the sources of his life and deeds. As Krishna, Vishnu is worshipped by millions of Hindus. He was ostensibly the son of Vasudeva and Devaki of the royal family of the Bhoja reigning at Mathura. The reigning prince at the time of his birth was Kansa, who, to prevent the fulfilment of a prophecy, sought to destroy the young child, but his parents, assisted by divine power, succeeded in baffling all his efforts. Every year of his life furnishes the subject of some legend, his story showing a remarkable resemblance to those of the Greek Heracles and Apollo. After a series of adventures, he slew Kansa, mounted the throne, and was at last killed by the arrow of a hunter shooting unawares in a thicket.—Cf. W. J. Wilkins, *Hindu Mythology.*

KRISH'NAGAR, a town of India, Nadiya district, Bengal, on the left bank of the Jalangi River. It has a college affiliated to the Calcutta University, a collegiate school, a considerable trade, and manufactures of coloured clay figures. Pop. 23,500.

KRITHIA, village of Gallipoli. It is about 4 miles from the end of the peninsula, and was the scene of severe fighting in 1915. It was attacked by the British on April 28, but the Turkish defences were too strong for them to reach it. On May 6–8 there was a further attack which also failed, but on June 4, a third attack resulted in the gain of a good deal of ground. Another attack, also partially successful, took place on June 28. A further effort was made in August and on Nov. 15 the Turkish positions were assailed for the last time, successfully, but in the following January Gallipoli was evacuated.

KRNOV. *See* JÄGERNDORF.

KROLEWSKA HUTA, formerly **KÖNIGSHÜTTE,** a town of Silesia, 5 miles from Beuthen, in the centre

Krishna

of the Silesian coal- and iron-fields. The inhabitants are chiefly employed in iron-working and mining, coal and iron being raised in large quantities, and also zinc. Pop. (1931), 81,287.

KRONE, monetary unit of Norway, Sweden, Denmark and Iceland. The word means crown. It is worth about 1*s.* 1½*d.* and normally 18 go to the £ sterling. It is divided into 100 ore. Before 1925 the krone was the monetary unit of Austria and was also used in Hungary.

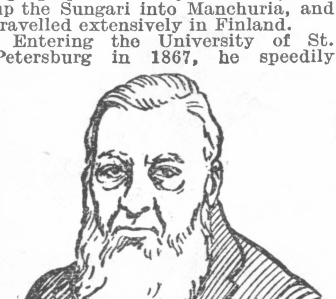
KROO, or **KRU,** a native race, West Africa. Noted as boat builders and hardy sailors. They are much employed for rough work on vessels trading on the Liberia coast. Their territory extends about 70 miles along the coast.

KROONSTAD, a town in the north of the Orange Free State, 90 miles

N.N.W. of Ficksburg. Pop. 9,354 (5,639 white).

KROPOTKIN. Prince Peter Alexeivitch, Russian geographer, author, and revolutionary, born at Moscow 1842, died 8th Feb., 1921. The scion of a powerful and ancient family, he was destined for the army, and entered the Corps of Pages, at St. Petersburg (Petrograd–Leningrad), in his fifteenth year. In 1862, his education being complete, he elected to join a Siberian Cossack regiment, and filled aide-de-camp and attaché posts successively at Chita and Irkutsk. He carried out a geographical survey in Siberia, went up the Sungari into Manchuria, and travelled extensively in Finland.

Entering the University of St. Petersburg in 1867, he speedily



Stephanus Johannes Paulus Kruger

developed revolutionary sympathies and joined the Petersburg revolutionary party and (1872) the International Society in Switzerland. He spread the cult of nihilism in Russia to such an extent that he was arrested and imprisoned in the fortress of Peter and Paul (1874), from which he escaped (1876), and preached his doctrine throughout Switzerland, England, and France until his arrest and sentence of five years' imprisonment at Lyons in 1883. Agitation eventually secured his release, and he settled in London, but returned to Russia (under Bolshevik domination) in 1917 and died at Moscow.

An anarchist and preacher of revolution, he reconciled his principles with those of an active and compassionate Christianity; he was a vigorous opponent, with both pen and speech, of coercion or violence, and the ideal government was represented by him as a federation of small communities wherein the individual would have an unrestricted field for the exercise of his own initiative. His wo include: *Memoirs of a Revolution Fields, Factories, and Worksho Orography of Asia*; *Russian Lite ture*; *The Conquest of Bread*; and *Great French Revolution*.—Cf. Robinson, *Comrade Kropotkin*.

KRU, negro people. They live scattered communities along the coa land of Liberia. They display aptitude for seafaring which has l to their contracting as Kru boys i service on vessels navigating t Guinea coast. They practise fa marking, tattooing and tooth mu lation. They number over 40,000.

KRUGER (krö'gėr), **Stephanu Johannes Paulus,** President of tl South African Republic (Transvaal was born in Cape Colony in 182. died in Switzerland 1904. He migrate in the 'great trek' of the Boers i 1837, and settled in the Transvaa where he became prominent in mil tary and civil affairs. He was Pres dent from 1883 till the annexation i 1900.

KRUGERSDORP, a gold-minin town of the Transvaal, South Africa 20 miles W.N.W. of Johannesburg Population by the 1921 census, 42,51 (13,439 white); white pop. (by censu taken in 1931), 13,653.

KRUPP, German family, famous a founders and directors of the Krupp works at Essen. Friedrich Krupp born 1787, died 1826, was a native o Essen. He started a small forge (1812). At his death the forge employed about a hundred hands, and was left almost entirely under the control of Frau Krupp, his widow, and her fourteen-year-old son, Alfred, under whom the business gradually developed until, in 1847, a three-pounder muzzle-loading gun, made of cast steel, was produced.

From that time Krupp marched triumphantly from one success to another, eventually exhibiting in London (1851), at the Great Exhibition there, a cast-steel ingot, solid and flawless, weighing upwards of 2 tons. This exhibit practically revolutionized the industrial world; the Bessemer-steel process, steam-hammer, and weldless steel tyres for vehicles were perfected and adopted. Steel guns began to be made by Krupp in quantity, and when Alfred died in 1887, his son, Friedrich Alfred Krupp, began to acquire iron- and coal-mines to ensure a steady supply of these materials for the use of the ever-expanding steelworks. By him also was the financial aspect reviewed and adjusted, and when he died (1902), his daughter, Bertha, turned the business over to a company under the directorship of Dr. Gustav von

ılen und Halbach, whom she rried in 1906, and who assumed title of Krupp von Bohlen und lbach.

ın 1912, at the time of the cen- ıary, Krupp controlled over 500 nes and quarries, and had factories Annen, Rheinhausen, and else- ıere, besides the gigantic steelworks Essen, where a staff of 70,000 men d women were employed. They ıo controlled the famous Germania ipbuilding Yards at Kiel-Tagel, and pplied armour-plate, guns, and ells to half the nations of the world. ıring the European war Essen was a tal, vulnerable spot in the German mour, for upon Krupp's 120,000 orkers depended almost entirely the tillery and general mechanical effi- ency of the Prussian army. On the ollapse of the Germans in 1918 the orks were reorganized, and now ıanufacture engines, cars, and ma- ıine-tools. *See* INDUSTRIAL VILL- GES; ESSEN.

KRYPTON, very rare element aving the symbol Kr and atomic eight 82.92. It occurs in extremely ıinute quantities in the atmosphere ıd has been found in varied gases iven off from the waters of mineral prings. It is distinguished by the ›right yellow and green lines in its ıpectrum.

KSHAT'RIYAS, the second or mili- ıary caste in the social system of the Brahmanical Hindus, the Brahmans being the first and the Vaisyas and Sudras the third and fourth. The natural duties of the Kshatriyas are bravery, generosity, rectitude, and noble conduct generally.

KUALA LUMPUR, capital of Selangor, Malaya, and of the Federated Malay States. Port Swettenham is its port. Pop. 111,738.

KUBAN, a republic of Ciscaucasia, which proclaimed its independence (1918) apart from association with Bolshevik Russia, and which was for some time in touch with Koltchak (q.v.). The administrative town was Ekaterinodar, and the republic had a total area of 36,500 sq. miles. It is now included in the North Caucasian area of the Russian Soviet Republic.

KUBELIK, Jan, Bohemian violinist born near Prague 1880, of farmer parents; he appeared in public as a violinist when only eight years old. In 1900 he visited London, and toured America in 1902 and 1903, being hailed everywhere as the leading violinist of his day.

KÛBLAI (kö'blā) KHAN, Mongol emperor, founder of the twentieth Chinese dynasty, that of the Mongol, or Yuen, born 1216, died 1294. In 1259 he succeeded his brother as Grand Khan of the Mongols, and in 1260 he conquered the whole of Northern China, driving out the Tartar or Kin dynasty, afterwards bringing Southern China under his domination also. Kûblai thus became sole ruler of an empire extending over a large part of Asia, as well as over those parts of Europe that had belonged to the dominions of Genghis Khan. Marco Polo, who lived at the court of this prince, describes the splendour of his court and entertainments, his revenues, his extraordinary paper currency, and his elaborate system of posts. Coleridge wrote a well-known fragmentary poem entitled *Kubla Khan.*

KUCHING (ku-ching'), the capital of Sarawak, on the River Sarawak, Borneo; contains the residence of the Rajah, and has a European quarter, a wireless station, and carries on a considerable trade. Pop. about 30,000.

KUEN LUN, or **KUNLUN,** a mountain range of Central Asia, stretching over a space of about 1,500 miles, and forming in its whole length the north frontier of Tibet, as the Himalaya does that of the south. Several of its peaks reach an altitude of over 21,000 feet, and the numerous branches stretching towards the Indus form valleys down which immense glaciers descend.

KUFAH, village of Iraq. It is 90 miles to the south of Baghdad. Here the caliphs lived before moving to Baghdad. It gives its name to a script used for the earliest copies of the Koran.

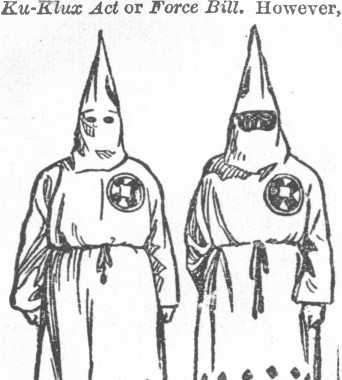
KUKA, or **KUKAWA,** a town in Western Africa, formerly the capital of Bornu, west of Lake Chad, and in the Bornu province of Northern Nigeria. Pop. estimated at 56,500.

KU-KLUX-KLAN, originally a secret society opposed to the measures introduced by the United States, pertaining to reconstruction and the abolition of negro slavery, after the Civil War of 1861–4. Formed in 1865 as a young white men's club at Pulaski, Tennessee, it developed into an all-America organization, having as its primary object the suppression of the negro in the United States.

General Nathan B. Forrest, quondam Confederate cavalry leader, was its supreme *Grand Wizard,* who controlled the Klan's *Invisible Empire,* embracing the entire Southern States. Each state represented a *Realm,* each county was a titular *Province,* and smaller groups and units all had their individual titles, as had also the Klan officers, known variously as *Grand Dragons, Grand Cyclops,* or *Grand*

Titans according to rank, and the ordinary members, who were simply *ghouls*.

In 1871 the Ku-Klux-Klan and all similar organizations were suppressed by an enforcement Act known as the *Ku-Klux Act* or *Force Bill*. However,



Ku-Kluz-Klan

as the blacks began to assert themselves in the South during 1915, and the United States then and subsequently formed a harbourage for all the dangerous spies and criminals of war-wrecked Europe, the Klan was revived with Colonel W. Joseph Simmons, of Atlanta, professor of history in Lanier University, as its *Imperial Wizard*.

Although a secret society, the Ku-Klux-Klan is officially advertised, and all efforts to probe its mysteries have failed hitherto. In 1920 a Congressional inquiry was held, but collapsed completely when an investigation was demanded of all secret societies, particularly the *Knights of Columbus* and the *Freemasons*.

KULDJA, a town and district of China, East Turkestan, on the Ili River, an important caravan centre. The district was taken possession of by the Russians in 1871, but retroceded to China in 1881. Pop. 12,500.

KULM (kulm).—1. A town of Poland, formerly in West Prussia, on the Vistula. It has manufactures of woollen cloth, and a trade in cattle. Pop. 11,600.—2. A village in Czechoslovakia, Bohemia, where, on the 29th and 30th Aug., 1813, a great battle was fought, in which the Allies (Austrians, Prussians, and Russians) totally destroyed a French army of 10,000 men under Vandamme.

KULTURKAMPF, a word first used by Professor Rudolf Virchow, and applied to the political struggle between the German Government and the Catholic Church. It started in 1870, immediately after the creation of the new German Empire, with Protestant Prussia as the leading state, and lasted for fifteen years.

The Catholic countries of the German Union, such as Bavaria, Baden, and the Rhine provinces, were alarmed and afraid of religious persecution on the part of Protestant Prussia, and the new political party, called the Centre, with a view to protecting and safeguarding Catholic interests, was organized. The hostility, however, against the influence of the Church of Rome gradually increased, and reached its climax when the Vatican proclaimed the dogma of Papal infallibility.

Many German Catholics, and especially the eminent theologian Döllinger, refused to acknowledge the new dogma, and were consequently excommunicated. They appealed to the Government, and Bismarck decided to avail himself of the opportunity to weaken the influence of the Roman Church. Between 1873 and 1875 the famous May laws, enacted by the Prussian Landtag, gave the State superiority over the Church, and

Kulm. Monument commemorating the defeat of Napoleon's army under Vandamme, 1813

power over the education of the Catholic clergy.

In 1875, when civil marriages were made compulsory, the struggle became more acute, and the opposition of the Catholics more pronounced, the influence of the Centre increased, and the party became more consolidated. Bismarck had now to deal with a powerful opposition in the Reichstag, and although he had previously declared that he would "never go to

Canossa," he opened negotiations with the new Pope, Leo XIII, and the majority of the laws of an anti-clerical nature were repealed.

KUM, or **KOOM**, a town of Persia, 80 miles s.w. of Tehran; formerly a place of great magnificence, but destroyed by the Afghans in 1722. Pop. about 25,000.

KUMAMO'TO, a Japanese garrison town, on the Island of Kiushiu, near Nagasaki. It had a famous castle which was burnt down during the Kagoshima Rebellion in 1877. Pop. (1930), 164,460.

KUMANOVO, town of Yugoslavia. It is 20 miles from Uskub. In Oct., 1912, the Serbians gained a great victory over the Turks here, the fighting occupying three days. During the Great War the town was taken by the Bulgars in Oct., 1915, and was not regained by the Serbs until Sept., 1918.

KUMA'ON, or **KUMA'UN**, a division of British India, United Provinces, in the Himalayas; area, 13,725 sq. miles; pop. 1,328,790. Although mountainous, it has also a strip of lower ground or *tarai*. It consists of three districts—Garhwal, Naini-Tal, and Almora. The capital is Almora, and there are two hill stations, Naini-Tal and Ranikhet. There are extensive and valuable tea plantations, and the forests yield valuable timber.

KUMA'SI. *See* COOMASSIE.

KUM KALE, a former Turkish fortress on the south shore of the Dardanelles.

KUMQUAT, a very small variety of orange tree (*Citrus japonica*) growing not above 6 feet high, and whose fruit, of the size of a large gooseberry, is delicious and refreshing. It is a native of China and Japan, but has been introduced into Australia.

KUN, Bela. Hungarian agitator of Jewish extraction. Born in 1886, he became a lawyer and a journalist. After the Great War, in which he served, he set up a Bolshevist republic in Hungary. This only lasted for a few months. He then went to Russia, but was again agitating in Hungary in 1927. In 1928 he presided at the Communist International, Moscow.

KUNDUZ, a state, town, and river of Afghanistan. The river rises in the Hindu Kush and flows into the Amu Daria. The state has a pop. of about 400,000.

KU'NERSDORF, a village in Prussia, in the province of Brandenburg, near Frankfort-on-the-Oder, the scene of the defeat of Frederick the Great by the combined Russian and Austrian forces 12th Aug., 1759 (Seven Years' War).

KUNGUR, a town of U.S.S.R., in the Oral Area. Here are the famous caverns of the *Ledinaya Gora* (ice-mountain), on the banks of the Iren. Pop. 40,974.

KUNIGUN'DÉ, SAINT, daughter of Siegfried of Luxemburg, married Henry of Bavaria, afterwards Henry II of Germany. Accused of adultery, she is said to have vindicated herself by walking over red-hot ploughshares barefooted. After the death of her husband, in 1024, she entered the convent of Kaufungen, which she had founded, and died as a nun in 1037. She was canonized in 1200 by Innocent III, her feast being 3rd March.

KUOMINTANG, the Nationalist party which since 1924 has been dominant in Southern China. Founded by Sun Yat-sen, it was responsible for the 1912 revolution.

KUR, or **KURA** (ancient **CYRUS** or **KÜROS**), a river of Georgia-Azerbaijan, rises in the mountains west of Kars, and falls into the Caspian Sea, below Baku, after a course of 825 miles.

KURDISTAN (kŭr-di-stän'; 'Land of the Kurds),' a region south of Armenia, in West Asia, and extending from the Euphrates to Lake Urmia, and from Lake Van to Iraq. The eastern part of Kurdistan forms the Persian provinces of Ardilan and Kermanshah, and the remainder is in Turkey, where, before the European War, it formed the principal part of the pashalic of Van, and a considerable part of that of Baghdad. In 1920 the abortive Treaty of Sèvres conferred autonomy upon Kurdistan.

It is mountainous, containing considerable forests of oak and other hard timber, and also numerous pastures, on which horned cattle, sheep, and fine-haired goats are reared, and in the valleys many fertile districts yielding rice, cotton, flax, fruits, and gall-nuts. It is drained by the Tigris and the Euphrates and their tributaries.

The Kurds, to whom the territory owes its name, are not confined within its limits, but are found in considerable numbers eastward in Khorasan and over the hilly region of Iraq, as far west as Aleppo and the Taurus. They are a stout, dark race, well formed, with dark hair, small eyes, wide mouth, and a fierce look.

On their own mountains they live as shepherds, cultivators of the soil, and bandits, some being nomadic and others sedentary and pastoral. Their language is a dialect of Persian, now much mixed with Arabic and Syriac; their religion Sunnite Mahommed-

anism. Their numbers have been estimated at 1,500,000.

KURÉ, a seaport and naval station of Japan, on the Inland Sea, Island of Honshiu. Pop. (1930), 190,282.

KURIA MURIA ISLANDS, a five-island group close to the south coast of Arabia. They were ceded to Britain by the Imam of Muscat (1854), were in the dependency of Aden till 1931, when they were transferred to the control of the Persian Gulf Residency. There are large guano deposits, but the islands are of more importance as a landing-place of the Red Sea cable. Area, 28 sq. miles (approximately).

KURILE ISLANDS, or **CHISHIMA,** a chain of thirty-two Japanese islands, North Pacific, extending in a northerly direction from Japan to Kamchatka; area, 3,969 sq. miles. The islands are of volcanic origin, and form part of the 'Pacific ring of fire.' Pop. about 5,000.

KURO'KI, Iamesada, Count, Japanese general, was born in 1844 at Saga, in the Island of Kiushiu. In 1871 he was appointed captain in the imperial army, and in 1878 promoted to the rank of colonel. In the Chino-Japanese War he was present as commander at the taking of Wei-hai-wei (1895), and at the outbreak of the Russo-Japanese War he was member of the Imperial Council of War and commander of the First Army. His exploits in Manchuria proved him one of Japan's greatest generals. He was created a count in 1905. He died in 1923.

KUROPAT'KIN, Alexei Nikolaievitsh, Russian general, was born in 1848, died in 1925. He entered the army, passed with distinction through the military schools, and was attached to the general staff in 1874. From 1874 to 1881 he served at various times in Algeria, Turkistan, Bulgaria, and Middle Asia. In 1898 he became Minister of War, in 1901 general of infantry.

At the outbreak of the war with Japan (1904) he was appointed commander-in-chief in Manchuria. Here he met with continuous reverses, and in March, 1905, was compelled to flee from Mukden, when he resigned his command. He commanded the Russian armies on the Northern front during the European War, and in 1916 was appointed Governor of Turkestan. He wrote *The Russian Army and the Japanese War.*

KURO SHIO (Jap., black tide), or **JAPAN CURRENT,** the Gulf stream of the Pacific, flows past Formosa, Japan, the Kuriles, the Aleutian Islands, and thence bends southwards to California. It is much inferior to the Gulf Stream both in volume and in temperature.

KURRACHEE (*ka-rä'chē*), or **KARACHI,** the third seaport of India after Calcutta and Bombay, on the coast of Sind, Bombay Presidency, at the western angle of the Indus delta, situated on a large and commodious inlet, forming a good harbour, safe in all winds, and out of the track of cyclones.

The town, which is fairly healthy, came into British possession in 1842, and contains the Napier Barracks and the Dayaram Jethmal Arts College. A railway runs from Kurrachee to Lahore, &c., and is connected with the Rájputána railway system. Pop. (1931), 263,565.

KURSK (*kursk*), a province of the Russian S.F.S.R., in the Central Black Earth region; area, 17,937 sq. miles. The climate is mild and dry. Pop. 3,226,200.—**Kursk,** the chief town, on the Tuskora near its junction with the Sem, forms a railway junction from Moscow, Kiev, and Kharkov. There are two cathedrals and a monastery. Pop. 98,794.

KÜSTENDJI (*küs-tend'ji*), or **CONSTANTZA,** a Rumanian Black Sea port exporting petroleum and timber. Pop. (1930), 58,258.

KÜSTENLAND (*küs'ten-länt*; 'Coast-land,') formerly, before the Treaty of St. Germain (10th Sept., 1919), an administrative division of the Austrian Empire, at the head of the Adriatic, consisting of the county of Gorz and Gradiska and the margraviate of Istria with the town of Trieste.

KÜSTRIN (*küs'trin*), or **CÜSTRIN,** a town of Germany, in the Prussian province of Brandenburg, on the Oder, at the confluence of the Wartha. It contains a castle in which Frederick the Great, when Crown Prince, was confined by his father, Frederick William I, in 1730, and has manufactures of machinery, and brass and copper wares. Pop. 18,000.

KUT, short name for Kut-el-Amara. A town of Iraq, 290 miles from Basra, it is almost encircled by the river Tigris and is a coaling-station for the Basra-Baghdad river steamers. It was rebuilt after the Great War and has some modern buildings. There is a cemetery for British and Indian soldiers.

A good deal of fighting took place at Kut during the Great War. In Aug., 1915, a British force was sent against the Turks defending it, and a battle took place on 28th Sept., the British being victorious. The British, under Sir C. Townshend, then moved

further up the river, but met with defeat at Ctesiphon and fell back on Kut in Nov. Kut was fortified and was soon surrounded by Turkish troops. Between Jan. and April, 1916, several attempts to relieve Kut were made, but failed, and on April 29, when the force was at starvation point, 9,000 troops, 6,000 being Indians, surrendered. In Jan., 1917, new forces having been collected and put under Sir Stanley Maude, the campaign for its recovery was begun. There was some hard fighting, but on 23rd Feb., 1917, the town was occupied by the British. Pop. 5,100. *See* EUROPEAN WAR.

KUTAIS (ku-tä'is; ancient **KOTATISION**), a town in the Georgian S.S.R., east of the Black Sea, on the railway between Poti and Baku, via Tiflis. Pop. 46,000.

KUTA'YA, or **KUTA'IAH** (ancient **COTYÆUM**), a town in Turkey Asia Minor, north-east of Smyrna (Izmir), on the line between Istanbul and Konia. It is the centre of the Turkey carpet manufacturing district, and the terminus of a branch of the Baghdad railway. Estimated pop. 17,282.

KUT-EL-AMARA. *See* KUT.

KUTU'SOV, Mikhail Larionovitsh, Prince of Smolensk, Russian field-marshal, born in 1745, died 1813. He served against the Poles and the Turks, and became lieutenant-general in 1789. He was successively Ambassador at Constantinople and Berlin, and in 1805 took command of the 1st Corps of the Russian army against the French. He defeated Marshal Mortier at Dürenstein, and commanded under the Emperor Alexander at Austerlitz.

In 1812 he was in an indecisive action at Borodino, retreated, and forced Napoleon to retreat from Moscow. For his victories over Ney and Davoust near Smolensk he received the title of Prince of Smolensk.

KUWAIT, state of Arabia. It is on the N.W. shore of the Persian Gulf and is ruled by a sheikh, or sultan. The chief town is Kuwait (Pop. 25,000.) It has a fine harbour and does a fair amount of trade. The sheikh is on friendly terms with the Government of India. Pop. 50,000.

KUYP (koip), or **CUYP, Albert,** Dutch painter, born at Dordrecht 1605, died 1691. He studied under his father, Jacob Gerritsz Kuyp, a painter of some fame, and was much influenced by Jan van Goyen. He painted with great success landscapes, cattle, river scenes, portraits, and pictures of still life. Kuyp particularly excelled in his treatment of veiled sunlight and the golden glow of late afternoon and evening. He is at his best in landscape. His most important work is in England, and is well represented in the National Gallery and Wallace Collection.

KVASS, Russian alcoholic beverage. It is made by fermenting rye meal, dough or bread, or wheat or barley meal, sugar and fruit being added. It contains from 1 to 2 per cent. of alcohol. It is made both commercially and in the home.

KWANGCHOW, a territory in China, province of Kwangtung, leased to France in 1898; area, 190 sq. miles; pop. 250,000. *See* WASHINGTON CONFERENCE.

KWANGSI, a province of Southern China. It is mountainous, and is watered by the numerous branches of the Sikiang and Kweikiang. Rice is grown, and gold, silver, and mercury are mined. Area, 77,200 sq. miles; pop. about 12,258,335.

KWANGTUNG, the most southerly coastal province of China. The northern part is mountainous, but the southern region is very fertile and rich minerally. It includes Hainan, Hong-kong (Brit.), and Kwangchow (Fr.). The capital is Canton. Area, 100,000 sq. miles; pop. 36,773,502.

KWANTUNG, the southern part of the Liaotung Peninsula, Manchuria. It is part of the territory leased to Russia in 1898, transferred to Japan in 1905, and leased to Japan in 1915. It includes Port Arthur and Dairen. Wheat, maize, beans, rice, hemp, and tobacco are produced, and salt is manufactured. Dairen has an excellent harbour. Area, 538 sq. miles; pop. 907,549 (191,795 Japanese).

KWEICHOW, a province of South-West China. It is called the Switzerland of China, as about seven-tenths of the province is mountainous. It produces rice, tobacco, and timber, and has mines of copper, iron, lead, and mercury. Area, 67,182 sq. miles; pop. 11,291,261.

KYD, Thomas, English Elizabethan dramatist, born 1558, died 1594, was the son of a London scrivener, and was educated at the Merchant Taylors School.

He published *The Spanish Tragedy,* which became popular in both Holland and Germany, and probably wrote the pre-Shakespearean play of *Hamlet.* He translated Garnier's *Cornelia,* was imprisoned by the Star Chamber (1593), put to the torture in Bridewell for sedition and heresy, and on his release fell into a state of abject poverty, which continued till his death. Kyd's works were collected by Professor F. S. Boas in 1901.

KYLE, district of Ayrshire. It lies between the rivers Doon and Irvine, and is one of the districts into which the county was at one time divided.

KYLEMORE, lake or lough of Co. Galway, Irish Free State. It is in the N.W. of the county, not far from Letterfrack, in the midst of magnificent scenery. There is Kylemore Castle, once a seat of the Duke of Manchester, a fine building decorated with Connemara marble.

KYLES OF BUTE, sea channel of Scotland. It is about 16 miles long, between the county of Argyll and the Island of Bute. It is famous for the scenery along its shores.

KYNETON, town of Victoria, Australia. A mining centre and pleasure resort on the river Campaspe, 53 miles from Melbourne. Pop. 3,400.

KYOTO, city of Japan. It is on the Island of Honshiu, 27 miles from Osaka. Kyoto is an industrial centre with manufactures of fancy goods and artistic ware. It is also an important railway junction and is well supplied with electric power. Pop. (1930), 765,142.

KYRLE (kerl), **John,** philanthropist, surnamed by Pope the *Man of Ross,* born in Gloucestershire 1637, died at Ross, Hereford, in 1724. His name is perpetuated in Pope's *Third Moral Epistle* (1732). Kyrle spent his life in building churches and distributing alms.

KRYIE ELEISON, Greek invocaton translated as *Lord have mercy upon us* and used in religious worship. In the mass it follows the introit and is repeated thrice to each person of the Trinity. *Christe eleison* is the variant used for the second person. In the Church of England it is used at both morning and evening prayer.

KYRLE SOCIETY, a British philanthropic association, the members of which belong to the well-to-do classes, and the object of which is to better the conditions of life for the poorer classes by laying out parks and encouraging gardening and house decoration. It was founded in 1877, and was named after John Kyrle. There are branches in most large towns.

L

L, the twelfth letter of the English alphabet, is usually denominated a semi-vowel or a liquid. *L* has only one sound in English. The nearest relative of *l* is *r*, the pronunciation of which differs from that of *l* only in being accompanied by a vibration of the tip of the tongue. There is no letter, accordingly, with which *l* is more frequently interchanged, instances of the change of *l* into *r* and of *r* into *l* being both very common in various languages. In fact in the history of the Indo-European alphabet *l* is considered to be a later modification of *r*.

LAALAND (lol'lân), or **LOLLAND**, an island in the Baltic, belonging to Denmark; greatest length, south-east to north-west, 36 miles; breadth, varying from 9 miles to 17 miles; area, 462 square miles. The surface is everywhere flat, and the soil is very fertile, yielding good crops and excellent timber. The capital is Maribo, and the seaport Nakskov, with which it is connected by rail. Pop. of the island, 76,280.

LAAR, or **LAER** (lâr) **Pieter van**, called **Il Bamboccio**, Dutch painter, born in 1582, died at Haarlem in 1642. He lived for a long time at Rome, and returned to Holland about 1639. He generally painted lively scenes from peasant life, fairs, children's games, hunting scenes (whence his nickname Bomes), and landscapes. He is represented in the galleries of Amsterdam, Dresden, Florence, Munich, Vienna, and in the Louvre. Three of his paintings are at Hampton Court.

LAB'ARUM, the imperial standard adopted by Constantine the Great after his miraculous vision of the cross and conversion to Christianity, differently described and figured, but generally represented as a pole having a cross-bar with the banner depending from it and bearing the Greek letters XP (that is, *Chr*), conjoined so as to form a monogram of the name of Christ.

LA BASSÉE, a town of France (Nord), manufacturing and mining centre. Early in the European War La Bassée was the scene of much desperate hand-to-hand fighting, and was captured by the Germans on 22nd Oct., 1914. Battered by the heavy artillery of friends and foes alike, little was left of the town when hostilities ceased, and it was adopted by Preston, England, under the scheme whereby British towns assisted financially in rebuilding and repopulating the devasted area. Pop. 4,415.

LABIA'TÆ, the mint tribe, a very important and extensive natural order of dicotyledons, with a gamopetalous corolla presenting a prominent upper and lower lip, and a four-lobed ovary, changing to four seed-like monospermous fruit nutlets. This order contains about 2,800 species, mostly herbs, undershrubs, or shrubs with opposite or whorled leaves, usually square stems, and a thyrsoid or whorled inflorescence.

They are spread throughout the world, and abound in all temperate latitudes. Many are valued for their fragrance, as lavender and thyme; others for their stimulating qualities, as mint and peppermint; others as aromatics, as savory, basil, and marjoram; several are used as febrifuges. Betony, ground ivy, horehound, and others possess bitter tonic qualities.

LABICHE (lâ-bēsh), **Eugene**, French dramatist, born in Paris 5th May, 1815, died in 1888. In collaboration with other authors he brought out upwards of a hundred plays, many of them very successful. They are mostly distinguished by extravagant plots, and are full of droll situations. In 1880 he was elected to the Academy. Among his well-known plays are: *Le Voyage de M. Perrichon*, *La Poudre aux yeux*, *Les Petits Oiseaux*, and *La Cagnotte*. One of his plays, *Un Chapeau de paille d'Italie*, was adapted and turned into an operetta by W. S. Gilbert, the music for it being written by George Grossmith. It was first called *The Wedding March*, and rechristened *Haste to the Wedding*.

LA'BIUM (Lat., 'a lip,') in zoology, a term applied to the lower lip of insects, the upper being called the *labrum*. It is made up of a pair of jaws more or less completely fused together.

LABLACHE (lâ-blâsh), **Luigi**, celebrated basso singer, born in Naples 1794, died there 1858. He was educated in the Conservatoire at Naples, and in 1817 obtained great success as Dandini in Rossini's *Cenerentola*. He first visited Britain in 1834, and became very popular. His best charac-

ter was Bartolo in *Il Barbiere*. He was not only a magnificent singer but a first-class actor.

LAB'ORATORY (literally a workshop), a room or building designed for investigation and experiment in chemistry, physics, engineering, biology, &c. It may be for special research and analyses, or for general work. To the former class belong the laboratories which are attached to dye-works, colour-works, chemical, and similar works. Laboratories are also attached to mining and metallurgical schools, to mints, to arsenals, &c.

In 1825 Liebig founded the first important chemical laboratory at Giessen, and in 1845 Lord Kelvin established the physical laboratory at the University of Glasgow. Other institutions of the kind are the Cavendish Laboratory at Cambridge (opened in 1874), the National Physical Laboratory at Teddington (1902), and the Pasteur Institute in Paris.

LABOUCHÈRE (lab'ų-shar, **Henry**, English politician and journalist, born 1831, died at Florence in 1912. Educated at Eton, he was in the diplomatic service from 1854 to 1864; became Radical member of Parliament for Windsor (1865–6), Middlesex (1867–8), and Northampton (1880–1905). In 1877 he started *Truth*, a weekly paper, which has become famous for its fearless criticism and acute censorship of public matters, and especially for its exposure of frauds and swindles.

LABOULBENIALES, a family of Ascomycetous Fungi, very peculiar both in structure and in their mode of life. All are minute plants growing attached to the bodies of beetles and other insects, but apparently doing no damage to their hosts. Although they have typical asci, their mode of reproduction is otherwise very like that of Red Algæ, a fact strongly suggestive of a real affinity between that group and the Ascomycetes.

LABOUR, MINISTRY OF, a department of Government set up by the New Ministries and Secretaries Act, 1916, to take over the powers and duties of the Board of Trade in regard to Industrial Conciliation, Labour Exchanges, Trade Boards (*see* LABOUR LEGISLATION), and Unemployment Insurance. The Labour Department of the Board of Trade, which collected and published statistics and information in regard to labour at home and abroad, employment, wages, prices, &c., has also been taken over, and the *Labour Gazette* is the organ of the Ministry of Labour for information in regard to the duties transferred to it.

A special department of the Ministry of Labour deals with Joint Industrial Councils ('Whi Councils') formed in accordance the recommendations of the C mittee on Relations between ployers and Employed under chairmanship of the Rt. Hon J. Whitley, M.P. These Councils, Joint District Councils and W Committees on similar lines, aim dealing with industrial matters mutual agreement between emplo and employed.

The number of Joint Indust Councils grew from 20, represent 1,500,000 workers, on 1st Jan., 1 to 51, representing over 3,000, workers, by the end of that year; total rose to 73, with 33 Inte Reconstruction Committees in 19 some of the latter being then rec stituted as full Whitley Counc Since then the number has fallen; 1925 there were 50 joint Indust councils and 7 Interim Reconstruct Committees. The total now is and one Interim Reconstructi Committee according to informati within the Ministry of Labour. 1923 the Ministry of Labour es mated the number of works co mittees in existence at considera over 1,000, but a large number ha since ceased to function.

An important function of the M istry of Labour concerns the adm istration of Acts of Parliament deal with industrial disputes. Under Industrial Courts Act, 1919, Ministry of Labour set up a perman court of arbitration, known as Industrial Court, to which dispu which the parties (trade unions a employers' associations) have fai to settle can be referred, on the c sent of both parties. This is normal method contemplated, alternatively the minister may, if parties desire, appoint a single ar trator or a special board of arbit tion selected by the parties from minister's panel. The minister is a empowered to establish a court inquiry in the case either of exist or apprehended disputes; the cons of the parties is not required. T court will issue a statement of merits of the dispute, and may o suggestions as to its settlement. T requests of such courts must be l before Parliament. The offices of Ministry are at Montagu Hou Whitehall, London, S.W. 1.

LABOUR AND CAPITAL. In or to produce goods a man requi premises in which to work, materi on which to work, and the tools of trade. He must also have a sufficie of food and necessaries to last until has marketed his goods. This st of prerequisites is the capital wh

his labour makes fruitful. In a primitive society the whole of the capital would be owned by the user, and until the industrial revolution created by the introduction of the steam-engine and the growth of the factory system, it might be said broadly that the capitalist was the master-craftsman. He was the owner of the workshop and the stock of tools with which, with a few helpers (journeymen and apprentices), he carried on his craft.

The enormous development of the factory system led to the final separation of the capitalist and the 'proletarian' manual worker. But for some time the capitalist remained the working or managing employer. With the further growth of capitalism and the development of financial capital in the form of investment in joint stock companies came the divorce, now very general, between capital and management, as shown by the existence, side by side, in the normal undertaking, of shareholders (represented by a board of directors), a managing staff, and clerical and manual workers.

With the congregation of wage-earners under one roof the old method of individual bargaining, supplemented by custom or legal control, as means of fixing wages became impracticable and was gradually abandoned, its place being taken, with the development of large-scale industry, by collective bargaining through accredited representatives on behalf of all the men engaged on similar work. This grouping of workers for industrial action in a 'trade union' has been defined as "a permanent combination of wage-earners for the protection or improvement of their conditions of employment."

Associations of employers are of equal antiquity, if they are not indeed older than the trade unions of workers. The early trade union legislation (i.e. the Combination Laws Repeal Act of 1824) applied to organizations of employers as well as those of workmen. But during the last quarter of a century there has been an enormous increase in the number and strength of the employers' organizations, accompanied by a corresponding movement towards federation and affiliation in each industry, and in 1919 by the formation of a National Confederation of Employers' Associations, for co-ordination in dealing with questions arising out of the relations between employers and their work-people.

Prior to the industrial revolution Parliament stood in a paternal relation to industry, but under the influence of the *laisser faire* theory, and under the anti-Jacobin influences caused by events in France, it met the movement towards combination of the industrial workers by the Anti-Combination Acts of 1799 and 1800. The Acts were, however, unevenly enforced, being almost dead letters in some regions and were rarely if ever invoked against the Employers' unions. Trade unionism, however, could not be suppressed, and eventually, in 1824, the Acts were repealed.

Since that time the trade unions have become the recognized channel for negotiating with employers. This advance in the status of working-class societies has been accompanied by the organization of semi-skilled and unskilled workers, women, and, more recently, of the so-called 'brain workers,' over 60 per cent of the adult male wage-earners of Great Britain being trade unionists at the beginning of 1921; since 1921 heavy falls in union membership attributable to prolonged unemployment and trade depression, have reduced the proportion of trade unionist workmen among the wage-earners.

Parallel to the growth of trade unionism there was a continuous movement towards greater unity, not only within trades, but also between them, for common industrial and political action. After several abortive attempts this definitely began with the inauguration, in 1868, of the Trades Union Congress, with a committee for parliamentary action, which has now become a General Council charged with co-ordinating and promoting action in the trade-union world. Trade unions also played a large part in the creation and organization of the political Labour party, and constitute the party's main source of strength.

In the main, organized labour for long acted in a defensive capacity, concerning itself with wages, hours, and conditions of the working-classes, without questioning the validity of the social structure of society, but since the '80's of last century Socialism has been its governing creed. Extensive agreements, particularly about wages, have, as organization strengthened, been entered into between employers and employed in all the principal trades in the country, the machinery often developing into voluntary standing Conciliation Boards, meeting at regular intervals or as required.

The method of payment agreed upon varies in each industry according to the character of the work. Thus in the cotton, boot and shoe, and coal-mining industries elaborate piece-price lists have been drawn up and are periodically revised; a standard time-rate is settled by carpenters and joiners, bricklayers, stonemasons, and

painters; in printing, engineering and boiler-making both systems are worked side by side; tailors work to piece-work lists with a time-rate basis; while in the Cleveland blast-furnace industry and Midland iron and steel trade wages are regulated by a sliding scale, in which the standard wage varies according to the market price of the product; the sliding scale system also operated in the mining industry for many years and in a modified form still exists.

These results were not achieved without many strikes, and in 1896 the principle of State assistance in settling disputes between employers and employed without strikes was endorsed by an Act authorizing the Board of Trade to settle disputes by conciliation or arbitration on appeal from the interested parties. This machinery has been further elaborated by the institution in 1919 of an Industrial Court, at which industrial cases may be heard on reference by the parties, which is usually secured by the intervention of the Ministry of Labour. The findings of the Industrial Court have, however, no legal force.

Compulsory arbitration and legal prohibition of strikes and lock-outs were introduced during the European War on the Australasian model, but have now been abolished owing to the unwillingness of employers and workers to accept compulsory findings; and though in some trades the rules of Conciliation Boards require that no stoppage of work should occur during negotiations, the right to strike or lock-out is always held in reserve as a last argument by both workers and employers.

Though joint machinery greatly reduces the danger of small or localized disputes, strikes are much more dangerous when they do occur, through the greater efficiency of the opposing organizations and the possibility of sympathetic action by unions in kindred trades, e.g. the railway strike of 1919, the coal strike of 1920; and the (so-called) General Strike of 1926. In practice, however, it has so far turned out that 'sympathetic action' by other unions has moderated the demands made by the workers, owing to the introduction into the dispute of parties less directly interested than the protagonists. Moreover, the Trade Disputes and Trade Unions Act, 1927, has made the 'sympathetic' strike as such illegal.

Since the repeal of the Combination Acts there has been increasing parliamentary interference in the relations between employers and employed under pressure of public opinion and concerted labour action. To give a few instances, a legal minimum wage has been recognized in the Truck Act 1831 and 1887; the Trade Board Ac 1909; the Coal Mines (Minimum Wag Act, 1912; and the Corn Productio Act, 1917. Hours of labour have bee successively reduced under variou factory Acts.

Safety and health have been guarde in the Employers' Liability Act, 1880 the Workmen's Compensation Act 1897; numberless factory Acts regard ing fencing of machinery, sanitation and dangerous processes; and the National Health Insurance Act, 1911 Subsequent amending Acts have modified these original measures by extending their scope.

The status of trade unions has been defined and funds protected by the Trade Disputes Act, 1906; and the Trade Union Acts, 1871–76 and 1913. The latest legislation, the Trade Disputes and Trade Unions Act, 1927, introduced important changes in the legal status and practice of the trade unions. Security and continuity of employment were promoted by the Labour Exchanges Act (1909), the National Insurance Act (1911) Part II, and by the Unemployment Insurance Acts of 1919 and later years, which cover all trades but agriculture and railway and domestic service.

During the European War trade unionists as such were nominated conjointly with employers on nearly all Government advisory committees: distress committees in 1914, food rationing in 1917, and profiteering tribunals in 1919; it is now generally the practice to include representation of the unions on government enquiries and tribunals of every description. They are also represented on the Tribunals of Appeal, which determine whether individual workmen are entitled to State unemployment benefit, and are part of the official machinery for administering both the National Health and the National Unemployment schemes.

Relations between labour and capital were originally confined to bargaining with regard to wages, hours and conditions of employment generally. Now labour is endeavouring to extend its influence, and its relations to capital are being modified in the direction of joint control. Where the initiative has come from the employer's side, it has usually taken the form of bonus schemes, profit-sharing, and copartnership, worker members occasionally holding shares in the business and electing members to the board of directors (e.g. the South Metropolitan Gas Company), but control is nominal, and is generally introduced concurrently with scientific management and general speeding up of the workers.

An official status has been given to the idea of joint control of industry by the Government's endorsement in 1917 of the formation of Joint Industrial (or Whitley) Councils in the well-organized industries, "to secure the largest possible measure of joint action between employers and workpeople for the development of the industry as a part of national life and for the improvement of the conditions of all engaged in that industry." The Councils, which can only exist in any trade by voluntary agreement between employers and workers, are composed of equal numbers of representatives of employers' associations and trade unions in the industry, and have a triplicate structure of national, district, and works committees, the last mainly concerned with welfare in the individual factory.

Hitherto these Councils have been mainly occupied with wages, hours, regularization of production and employment, and the vexed problem of demarcation between processes and industries. They are, however, also interested in education, research, health, welfare, &c., and a valuable inquiry into methods of costing has been made by the Council for the Building Trade. At present decisions of the Council have no legal weight, but the problem of their legal enforcement is growing in importance.

In many industries conciliation is dealt with separately by existing machinery, and most of the largest industries in the country, including cotton, coal, iron, engineering, shipbuilding, and mining, have failed to set up Joint Councils, pleading the adequacy of their present machinery for collective bargaining. (*See* LABOUR, MINISTRY OF.)

After a lock-out of miners in 1921 the Sankey Coal Commission was appointed. Its recommendations, including nationalisation of coal mines, were not acted upon by the Government.

In 1926 a sympathetic strike by the Trade Unions of Great Britain was undertaken in support of the Miners' Federation in their dispute with the coal-owners. The Samuel memorandum, prepared as a basis of settlement, was accepted by the T.U.C. but rejected by the Miners' Federation. The 'General' Strike, therefore, ended inconclusively. Since that time a number of smaller disputes, including the Lancashire Cotton Strike, have taken place.

Other countries are less advanced in methods of collective bargaining than Great Britain. In Germany, after the Revolution, special provision was made in the Constitution for the utilization of industrial knowledge by the constitution of District Economic Councils and a National Economic Council, composed of equal numbers of representatives of workers and employers in each industry, these bodies exercising close supervision over all legislative measures affecting the industry as well as general 'economic functions.' This system has, however, been abrogated in Germany (and also in Italy) by the Fascist system of syndical or corporative organization. (*See* FASCISM.)

Joint councils of employers and employed, with a neutral chairman appointed by the Department of Industry, have been formed since 1919 in all the important industries in Belgium, and have been given legal status.

The Mines Commission, instituted by royal decree in April, 1919, may be taken as an example. It consists of ten representatives of the Coal-owners' Association, eight representatives of the Socialist Miners' Union, and two of the 'Christian' Union. Its duties are to fix the hours of labour, wage scales, and general labour conditions for the industry. It has instituted district councils, local councils for each mining concern, and pit committes. Arbitration is not compulsory, but no strike may take place until two weeks have been allowed for attempts at the settlement of the dispute by conciliation.

In France the labour policy is one of revolutionary syndicalism, and collective bargaining has not been developed to anything like the efficiency it has reached in the United Kingdom. An Economic Labour Council has been formed by the trade unions, with a view to obtaining the ultimate control of industry.

In Italy a revolutionary change in the status of the unions and the practice of collective bargaining by the Fascist government of Mussolini and similar changes are now (1933) proceeding in Germany under 'National Socialist' government of Hitler (q.v.).

LABOUR COLONIES have been founded in the United Kingdom at various times to alleviate unemployment. The idea of labour colonies is derived from the Poor Law, through the Mansion House Fund of 1903–4, and the Unemployed Workmen Act, 1905. Noteworthy instances are the colonies which were established during a time of severe trade depression at Osea Island and Hadleigh Farm, in connection with the Mansion House Fund of 1903–4. Work was offered at some distance from London to London men who were prepared to leave their wives and families. The men were to live in lodgings provided near the work, be provided with board and

pocket-money, while their wives received maintenance allowances. The work was mainly navvying.

Several important principles were applied in setting up these colonies. Work was given—regular work and not money. The men were carefully selected according to their previous industrial record, while the relief given was less attractive than the man's ordinary employment, because he had to submit not only to separation from his family, but also to remuneration upon a lower scale.

Similar colonies were set up under the scheme for the relief of London unemployed introduced in 1904 by Mr. Walter Long, then President of the Local Government Board, the farm colony at Hollesley Bay, in Suffolk, being the most important. This farm colony was meant to remove men altogether from the urban labour market by training them for work on the land, and encouraging them to take small holdings.

On the Continent labour colonies have had a wider scope. Industrial training has been provided as well as field work. In some cases, too, e.g. in Belgium and Switzerland, men can be compulsorily detained. In England, on the other hand, no power of detention has been given, and no opportunity given for industrial training, while the colonies have usually been of a temporary character.

The development of the national system of unemployment insurance superseded to some extent the idea of labour colonies with their Poor Law atmosphere of 'deterrence' and brought in the system of training centres. It was thought by many writers that labour colonies might usefully be established on a permanent basis in this country to serve as institutions, in the first place providing technical and general training for men to whom it is desirable to teach a new occupation, and secondly, offering a more or less permanent home to the derelicts of industrial life. It is now realized, however, that the problem of unemployment is much more complex than when the unemployed were regarded as composed mainly of 'unemployables' plus a proportion of genuinely surplus labour.

The most notable example of a Scottish labour colony is at Palacerigg, instituted many years ago by the Glasgow Corporation, and at one time the most extensive colony for the relief of unemployment in Great Britain. Under the Ministry of Agriculture a scheme has been outlined for the creation of labour colonies upon the identical system, a group of small-holders forming, in this case, a colony under a central controller ar adviser.

LABOUR LEGISLATION. U fettered industrial competition, making success dependent on t cheapening of production, acts as constant incentive to nibbling at t price of labour, whether by dire cuts in wages, by the lengthening the working day, or by recourse t the 'pocket-money' labour of wome and children. The result, as was see in England in the early years of la century, is gross exploitation of th most defenceless workers—the wome and children, and the men withou special skill.

Thus, long before the right of work men to organize in their own defenc was conceded in this country, it wa recognized that the freedom of em ployers must be limited by legislativ regulation of the terms and condition of employment. It is now over hundred years since Robert Owe fought against the 'white slavery' o little children in factories in hi agitation for Sir Robert Peel's Fac tory Bill, which became the Act o 1819, the first step in its direction being taken by Peel in his Health and Morals of Apprentices Act, 1802, designed to protect child labour in the cotton factories.

The body of protective labour legislation now in force is of three main classes, affecting the legal, social, and industrial aspects of employment. The Truck Acts, 1831, 1887, and 1896, require the payment of wages in coin, and forbid any stipulation as to where, how, or with whom they shall be spent. The attachment of workmen's wages is forbidden by an Act of 1870. The Employers' Liability Act, 1880, rendered employers liable for damages for injuries suffered by their workpeople owing to negligence on the part of the employers or their subordinates, while the Workmen's Compensation Acts of 1897, 1900, and 1906 with later amending Acts, notably those of 1923, 1924, 1925 (a Consolidation Act), and 1931, provide for compensation for injuries (including industrial diseases) irrespective of negligence of the employer or his agent.

The National Insurance Acts, and various amending Acts, from 1911 to 1931, provide for insurance against sickness and unemployment; the national organization of labour exchanges was set up under the Labour Exchange Act of 1909.

The Conciliation Act, 1896, empowered the Board of Trade to take steps to promote the settlement of labour disputes. The Act is permissive only, organized labour in this country being against compulsory

arbitration. The powers and duties of the Board of Trade under this Act, and in regard to labour exchanges, trade boards, and unemployment insurance, were transferred to the Ministry of Labour by the New Ministries and Secretaries Act, 1916; extended powers of intervention in trade disputes being conferred upon the Ministry by the Industrial Courts Act, 1919.

Modern British factory legislation begins with the Act of 1819 already mentioned. Under this Act the employment in cotton or woollen mills of children *under nine years of age* was prohibited, and the working day for those under sixteen limited to twelve hours. In 1833 the hours of work of children *under eleven* were limited to forty-eight weekly, and of young persons under eighteen to sixty-nine.

The Act of 1833 endowed the administration with four factory inspectors, the beginning of the elaborate system of to-day. Women's employment was first dealt with in the Act of 1844, which also introduced the 'half-time' system, limiting children's employment to thirty-three hours in the week.

In 1847 the working day was limited for women and young persons to ten hours; this had the result of making the ten-hour day general in textile factories.

These Acts applied to textile factories only. Their provisions were made applicable to various other industries in 1860–4. In 1874 the minimum age at which children might be employed was raised to ten, and not until 1889 was it indirectly raised to twelve by the Elementary Education Act, which made full-time school attendance compulsory up to that age.

The Factory Act of 1891 placed the sanitation of factories and workshops under the control of the Local Sanitary Authorities, and made more stringent the safety rules and the regulations for the protection of workers in lead-factories and other factories or workshops certified as dangerous to health. This Act was in part a result of the International Labour Conference at Berlin in 1890.

In 1895 laundries, and docks, wharves, and quays were brought within the scope of the Factory Acts. The existing factory legislation was further amended and consolidated by the Factory Act of 1901. Further legislation designed to bring the Factory Acts up to date and to extend their scope has been framed by the Home Office under more than one post-war government, but no later Act than the 1901 Act has been passed.

The regulation of employment in mines begins with the Mines Act of 1842, which prohibited the employment underground of women and girls, and of boys under ten. Rules concerning safety in mines were first embodied in legislation in 1855. The existing laws were consolidated in the Act of 1887, which remains the basis of the regulation of employment in mines.

The Factory Acts mainly affect classes of work-people who have achieved an advanced stage of trade union organization, such as miners and cotton operatives. The other end of the scale was reached by the Trade Boards Act, passed in 1909 virtually without opposition, under which certain classes of workers were to be 'scheduled' by the Board of Trade (now by the Ministry of Labour), as requiring the regulation of the rates to be paid for time- and piece-work. This regulation is entrusted to joint boards of employers' and workers' representatives.

The chain-making trade was the first dealt with, and a number of others have since been scheduled. The rates fixed by the boards are obligatory upon the trade. The employment of children otherwise than in factories is governed by the Employment of Children Act, 1903, under which by-laws may be made by local authorities.

Numerous Conventions drafted by the International Labour Conference of the League of Nations dealt with legislation to govern hours of labour. A recommendation for the adoption of a forty-eight-hour week was not, however, ratified by the Government.

The Emergency Powers Act was passed in 1920 as a result of the miners' dispute. By it the Government was enabled to take necessary steps to enforce peace and maintenance of essential supplies and transport.—BIBLIOGRAPHY: Abraham and Davies, *Law Relating to Factories and Workshops*; B. L. Hutchins and Harrison, *A History of Factory Legislation*; Cohen, *British System and Social Insurance*.

LABOUR PARTY. The present Labour Party came into existence in 1900 as the Labour Representation Committee (L.R.C.) and took its present title of Labour Party after its successes in the General Election of 1906. It had its origin in the Labour Representative League, founded in 1869. Five years later the power of the League was still so limited that of fourteen candidates presented to the polls in 1874, only two were returned. In 1892 the number of elected representatives had increased to fourteen, the progress indicated being due less to

the formation of the Labour Electoral Committee in 1886 than to persistent Socialist propaganda. In 1893 was formed the offshoot known as the Independent Labour Party, a definitely Socialist body which co-existed side by side with the Social Democratic Federation and the Fabian Society. (*See* SOCIALISM.)

A conference of the Labour Party took place in London in 1900, and resulted in the formation of the Labour Representation Committee, which may be regarded as the direct ancestor of the present party. It represented a federation of the trade unions with the Socialist societies and a few co-operative societies. It repudiated all alliances with the older political parties and maintained an independent attitude which, however, left it free to support, when occasion offered, whichever side held out the greatest inducement.

In 1906 fifty Labour candidates presented themselves at the polls, and of these twenty-nine were returned to Westminster, where, for the first time, they formed a recognized political group. There was already in the House of Commons a group of 22 trade unionist M.P.'s more than half of them miners' representatives, who were also indentified as Labour men but were for the most part attached to the Liberal party. During the next few years this group (with the exception of two or three individuals) threw in their lot with the labour party, the formation of a single party being signalized by the affiliation of the Miners' Federation of Great Britain to the Labour party on the same basis as that of other big trade unions. In 1918 the Constitution of the Labour party was broadened to admit individuals to membership, thus enlarging the non-manual element formerly elegible only as members of the socialist societies. From its inception in 1900, of course, the Labour party has advocated a Socialist policy.

Among the main planks on which the Labour Party takes its stand are: a national minimum standard of life; democratic control of industry; a better system of national finance; a levy on capital, with the application of surplus wealth to the common good. It is, further, a steady supporter of a policy of international peace, and an inveterate opponent of imperialism. Its policy has become more constructively Socialist and was clearly avowed as such in its electoral programmes *Labour and the New Social Order*, (1918) and *Labour and the Nation*, (1929).

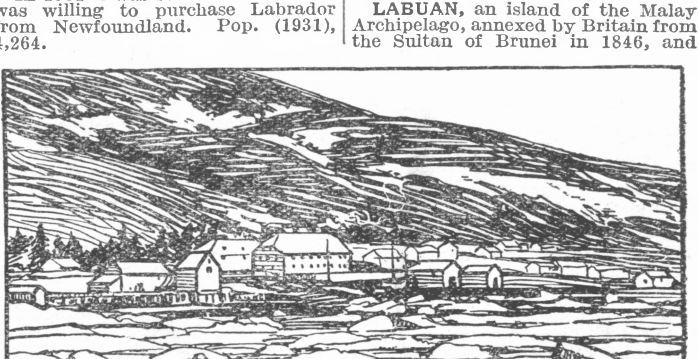
In 1923 the Labour Party became the official Opposition in the House of Commons, and in 1924 it formed first government, which had a s life of nine months; but a sec Labour Ministry was in power f May, 1929, to August, 1931. In autumn of 1931 a financial c originating with the failure of cer continental banks, produced divis of opinion in the Labour Cabinet to the measures to be taken to s guard the country's economic p tion. As a result, the Prime Minis (Mr. Ramsay MacDonald (q.v.) three of his Cabinet colleagues, s ported by about half a dozen of Labour members in Parliament tered into an alliance with the C servative and Liberal parties a formed a 'National' Governme The majority of the Labour Cabi ministers, and members of parliame resisted this policy and went i opposition. In the ensuing Gene Election (1931) the Labour par sustained a severe defeat, most of leaders, including Mr. Arthur Hend son (q.v.), losing their seats. T strength of the party in Parliame was reduced from 265 members 51, though its poll in the constituti was considerably more than million (actually 6,631,785), as com pared with 12,021,345 votes recorde for the Unionist party of whose 51 candidates no fewer than 471 secure seats—a gain of 209 seats over the number in the previous parliamen

The Labour Party holds an annu conference, and its headquarters a at Transport House, Smith Squar Westminster, S.W. 1. Associate with it is the **Parliamentary Labou Party**, composed of all Labour mem bers of Parliament, with the excep tion of three or four members of th Independent Labour Party who re tained their seats in the 1931 Genera Election and ceased to receive th Labour 'Whips' after their organiza tion withdrew from affiliation witl the Labour Party.

Labour Parties have obtained poli tical power in other countries, es pecially Australia. There it has dominated the politics of the several states and has been in power for a considerable portion of the Commonwealth's existence, its federal leaders being Mr. A. Fisher, Mr. W. M. Hughes and Mr. J. H. Scullin successively. The Labour Parties in Canada and the United States have not yet secured political power, but in Canada Farmer-Labour coalitions have formed governments in several of the provinces. In Belgium the Labour party, in Sweden and Denmark the Socialist party, and in Germany the Social-Democratic party have formed governments alone or in alliance with other parties.

LABRADOR, Canadian peninsula, he most easterly part of the American ontinent; area, about 500,000 sq. niles. It is divided between Quebec nd Newfoundland, the former having nnexed Ungava in 1912. The nterior is occupied by the Labrador Plateau, some 2,000 feet high, and by extensive forests. After a very long dispute, the Privy Council in 1927 awarded to Newfoundland an area of 110,000 sq. miles, instead of the narrow coastal strip which it formerly held.

In 1932 it was stated that Canada was willing to purchase Labrador from Newfoundland. Pop. (1931), 4,264.



Labrador

The climate is rigorous, and no ordinary cereal can be grown; but the Labrador cod-fishing and the famous lobster-fisheries employ annually some 30,000 hands. The population is mainly Eskimo, with some Algonquin Indians and a few whites, and there are several Moravian mission stations on the coast. Labrador was annexed by Britain in 1763.—BIBLIOGRAPHY: H. Y. Hind, *Explorations in the Interior of the Labrador Peninsula*; W. T. Grenfell, *Labrador: the Country and the People*; W. G. Gosling, *Labrador.*

LABRADORITE, or **LABRADOR FELSPAR,** a mineral found in a coarse-grained gabbro on the coast of Labrador, where it reveals a fine iridescent shimmer through the occurrence of minute plates of hæmatite regularly arranged in planes in its interior. Labradorite is the common felspar of gabbro and basalt throughout the world.

LAB'RIDÆ, the wrasses, a family of spiny-finned marine fishes, having the genus Labrus as the type. They are found on all temperate and tropical coasts, are usually of brilliant colour, and sometimes make nests. They possess strong crushing teeth. A well-known British species is the striped or cuckoo wrasse (*Labrus mixtus*), of red and yellow colour with longitudinal blue stripes in the male.

LABUAN, an island of the Malay Archipelago, annexed by Britain from the Sultan of Brunei in 1846, and administered by the Straits Settlements since 1907. It has an area of 30 sq. miles; the interior is hilly and the soil fertile; but the annual rainfall is very heavy, varying in average from 24 inches (spring) to 40 inches (autumn), with 28 and 36 inches in summer and winter respectively. The capital is Victoria, and has exports of sago. Coal was mined in the island until 1911. Pop. 7,500, mainly Malays and Chinese.

LABUR'NUM, a tree of the genus Cytisus, the *C. Laburnum*, nat. ord. Leguminosæ, a native of the Alps, much cultivated by way of ornament. It is well and widely known for the beauty of its pendulous racemes of yellow pea-shaped flowers. The seeds contain a poisonous substance called cytisine, and are violently emetic. The wood is much prized by cabinet-makers and turners, being

wrought into a variety of articles which require strength and smoothness.

LAB'YRINTH, a structure having numerous intricate winding passages, which render it difficult to find the way through it. The word is probably derived from the Greek *laura*, a lane. The Egyptian, Cretan, and Samian labyrinths of antiquity were famous. The legendary labyrinth of Crete, out of which no one could find his way, but became the prey of the Minotaur, was said to have been constructed by Dædalus. The hint of this legend was probably given by the fact that the rocks of Crete are full of winding caves.

The Egyptian labyrinth was a building situated in Central Egypt, above Lake Mœris, not far from Crocodilopolis (Arsinoe), in the district now called the Fayoum. The building, half above and half below the ground, contained 3,000 rooms. It was probably a place of burial.

The labyrinth at Clusium, in Italy, was erected by the Etruscans, according to Varro, for the sepulchre of King Porsenna. There were other labyrinths at Lemnos and Samos, but their sites are unknown. Imitations of labyrinths, called mazes, were once fashionable in gardening. They were made of hedges of privet, or some similar shrub. The best known is that at Hampton Court.

LABYRINTH'ODON, a genus of fossil amphibians, whose remains are found in the Carboniferous, Permian, and Triassic formations, those of the Trias which are found in England being the largest. Some attained great size, the skull of Mastodonsaurus being 3 feet long. The name is derived from the labyrinthine structure of a section of the tooth, owing to the infolding of the cement from the outer surface. Footprints of Labyrinthodon resembling impressions of hands gave rise to the name Cheirotherium.

LAC, LAK, or **LAKH,** from the Sanskrit *laksha*, that is, 100,000. In India it is applied to the computation of money. Thus, a lac of rupees is 100,000. One hundred lacs, or 10 million rupees, are a *crore* (Sanskrit *koti*).

LAC, a resinous substance produced upon numerous Indian trees by an insect, *Coccus ficus* or *Coccus lacca*. The finest is found on the palas or dhak (*Butĕa frondōsa*), the peepul (*Ficus religiōsa*), and the koosum (*Schleichĕra trijŭga*). It is composed of five different varieties of resin, with a small quantity of several other substances, particularly a red colouring-matter.

It is formed chiefly by the female insects, each of which inhabits a cell, the incrustation of which seems intended to serve as a protection for the young. When the covering is complete, the eggs are laid and the mother dies. The young break their way out, swarm on to the bark, and immediately commence the secreting of lac.

In India the cultivation of the lac insect has received much attention. *Stick-lac* is the substance in its natural state, encrusting small twigs. When broken off and washed with water, it almost entirely loses its red colour, and is called *seed-lac*, from its granular form. When melted and reduced to a thin crust, it is called *shellac*. Mixed with turpentine, colouring-matters, and other substances, lac is used in the manufacture of coloured sealing-wax. Dissolved in alcohol or other solvents, it constitutes various kinds of varnishes and lacquers.

Lac-dye and *lac-lake* are colouring-matters used in dyeing cloth scarlet, obtained by different processes from stick-lac. In the state in which they are found in commerce they have the form of little cakes. They were formerly obtained only from the East, but a superior kind of lac-dye is now manufactured in England from stick-lac. The colouring-matter of lac-dye is analogous to cochineal.

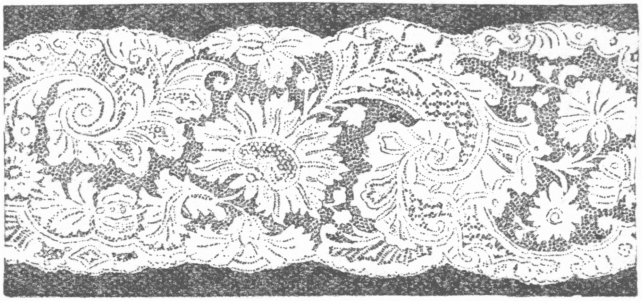
LAC'CADIVE ISLANDS, a group of fourteen coral islands, British, in the Arabian Sea, off the Malabar coast of India; 11° 20′ N., 72° 31′ E. They were discovered by Vasco da Gama in 1499, and were attached to the Madras Presidency in 1875, the northern islands being administered by S. Kanara, and the southern by the collector of Malabar.

Nine of the Laccadives are inhabited, and are covered with cocoa-nut plantations that yield coir or coco-nut fibre, which is soaked in the island lagoons by the natives, and is the staple product. They cover an approximate area of 80 sq. miles, and have a pop. of (1931), 16,046, mainly Mahommedan. The language is Malayalam or Mahl.

LACCOLITH, term used in geology. It is applied to an intrusive igneous rock which has been forced up in a molten state to spread between the overlying strata forming a lenticular mass. Owing to this intrusion the superficial strata have become elevated into a large anticlinal dome, examples of this structure being met with in Utah.

LACE, a kind of ornamental open-work fabric, formed of silk, flax, or cotton thread. It is made either by hand or machine, the former being

produced by the needle, or made on the pillow. Needle laces are called *point*, those made on the pillow, *cushion*, *bobbin*, or *bone* laces. A prominent feature in all laces is the pattern or ornament; this may be worked either with or without a groundwork.



Mechlin Lace. From a specimen in the South Kensington Museum

Pillow lace consists of hexagonal meshes, four of the sides of each mesh being formed by twisting two threads round each other, and the other two sides by the simple crossing of two threads over each other. The pattern on parchment or vellum is attached to the pillow, and pins are stuck in the lines of the pattern, round which the threads are plaited and twisted so as to form the required design. Among the laces of this class are Honiton, Buckingham, Mechlin, Valenciennes, &c.

Point laces, made entirely by the needle and single thread, are known as Brussels, Alençon, Maltese, &c. Guipure lace consists of a network ground on which patterns are wrought in various stitches with silk, &c. It was originally a lace made in silk, thread, &c., on little strips of parchment or vellum.

At Nottingham and elsewhere imitations of lace are produced by machines, called point net and warp net, from the names of the machines in which they are made. They are both species of chain work, and the machines are varieties of the stocking-frame.

The manufacture of lace appears to have existed from a considerably remote antiquity, as in the representations of Greek women's dresses which have come down to us the garments are frequently ornamented with lace of beautiful patterns. In modern times point lace originated in Italy, from which the manufacture spread to Spain and Flanders. Pillow lace was first made in the Low Countries. — BIBLIOGRAPHY: Mrs. J. H. Pollen, *Seven Centuries of Lace*; William Felkin, *Hosiery and Lace*; F. Nevill Jackson, *History of Hand-made Lace*.

LACE-BARK TREE (*Lagetta lintearia*), a tree of the nat. ord. Thymelæaceæ or Daphne family, is a native of the West Indies. It receives its common name from the fact that when its inner bark is cut into thin pieces, after maceration it assumes a beautiful net-like appearance. It is used by women by way of ornament, and the negroes manufacture matting from it.

LACE-WING FLIES, STINK FLIES, or **GOLDEN EYES,** insects of the genera Hemerobius and Chrysopa, ord. Neuroptera, with delicate gauzy wings. Their eyes have a metallic sheen, and the eggs are supported on slender stalks. The larvæ are exceedingly voracious, and feed upon aphides.

LACEDAEMON, in Greece, a name, used interchangeably with Laconia, for the district around Sparta (q.v.).

LA CHAISE, Francois de, French priest. The son of a noble, he was born at Aix, 25th Aug., 1624, and educated at Lyons. He became a member of the Society of Jesus and was appointed in 1674 confessor to

Lacewing

Louis XIV, a position which he held until his death, 20th Jan., 1709.

His name is borne by a cemetery in Paris (**Père La Chaise**), one of the most famous in the world.

LACHINE (là-shēn), a town of Canada, Quebec province, situated on Montreal Island, 8 miles from Montreal, with which it is connected by an

electric railway. It is a favourite summer-resort, and has stations on both the Canadian Pacific Railway and the Grand Trunk Railway (now Canadian National Railway).

The Lachine Canal runs to Montreal, and avoids the rapids of the St. Lawrence at this point. These rapids supply power to the Montreal and neighbouring factories. In 1669 the place was sarcastically dubbed *La Chine* because the owner, Robert de la Salle, imagined it was on the direct route to that country. Pop. 15,404.

LACHISH, ancient city of Palestine. It stood 16 miles from Gaza and was a place of importance in early times. The site has been excavated and valuable discoveries made. It is mentioned several times in the Bible, and in Joshua x. there is a reference to the King of Lachish.

LACHLAN, a river of New South Wales, Australia, joins the Murrumbidgee, and the united streams merge with the Murray 40 miles lower down; total length, 700 miles.

LACHMANN (lăh'mân), **Karl,** German critic and philologist, born at Brunswick 1793, died at Berlin 1851. He studied at Leipzig and Göttingen, became a professor at Königsberg in 1818, and at Berlin in 1827. His edition of Lucretius was of service to H. A. J. Munro, whose edition superseded it. Lachmann also published valuable editions of old German classics, such as the *Niebelungenlied* and the works of Walther von der Volgelweide.

LA CONDAMINE (lå kon-dâ-mēn), **Charles Marie,** French traveller and mathematician, born at Paris 1701, died 1774. He joined the army, but soon resigned, and devoted himself to the sciences. In 1736 he was chosen, with Godin and Bouguer, to determine the figure of the earth, by measurements to be made in the equatorial regions of South America, and he remained abroad for eight years. In 1748 he was elected a Fellow of the Royal Society of London, and in 1760 a member of the Academy of Sciences of Paris. His principal works are: *Distance of the Tropicks, La Figure de la Terre, Journal du voyage fait par ordre du roi à l'équateur,* and *Mémoires sur l'inoculation.*

LACQUERING, the application of coloured varnishes to metallic and wood articles. The term is derived from lac (q.v.), which is the basis of all true lacquers. In early days the Chinese were the greatest artists in lacquer, but about the beginning of the sixth century the process was introduced to Japan, where the development was very rapid, new ideas were introduced, and the later finest work was produced.

The article to be treated is usually made of fine white pine. It is first sand-papered to a good surface, sized, and then the lacquer is applied in coats, each allowed to dry before the next is applied. Gold, mother-of-pearl, and other materials are sometimes affixed after the applications of the coloured lacquers are completed.

Parts to be shown in relief are built up with putty and lac. The colouring matters are introduced into the lacquers before use. The skeleton markings of leaves and flowers, and grainings, are inserted after the later coats, and transparent lac varnishes are used to finish.

CELLULOSE LACQUERS, an important recent development is the use of cellulose lacquers for motor-car bodies, &c., also for aeroplane wings. For the latter cellulose acetate is generally used; for the former nitrocellulose, dissolved in a special solvent, diluted and allied with gums, colouring matter and a softening medium such as linseed or castor oil. These lacquers give a smooth, hard and durable surface and take a high polish.

LA CROSSE, a city of the United States, Wisconsin, on the Mississippi at the confluence of the Black and La Crosse Rivers, a great railway centre and lumbering-town, with grain elevators and flour-mills. Settled in 1841, it became a city in 1856. Pop. (1930), 39,614.

LACROSSE, the national ball game of Canada, where it originated with the Indians, and was copied and modified by the French Canadians. The name is derived from the resemblance of the 'crosse' to a bishop's crozier. At first the game was a very rough one, but in 1867, when it became a national institution, a representative body, the National Lacrosse Association of Canada, was formed, and definite rules were established and enforced.

The game is very popular in the London suburbs and in south Lancashire. International contests are no longer held, but the annual contests between North and South take their place, and the competitions for the premier positions or flags in these sections are keenly contested. The North has most teams, and shows considerable superiority in the championship and North *v.* South matches. Oxford and Cambridge award a half-blue for lacrosse and hold an annual match.

The crosse is a stick with a curved end to which is attached, fairly tightly, a triangular-shaped network

of strips of leather (leaders) interlaced with coarse catgut, in the meshes of which the ball cannot be entangled, nor can the entire network act as a bag. The ball is of spongy india-rubber approximately 8 inches in circumference, and weighing 4½ to 5 oz. The shoes worn by the players must be rubber-soled, and without spikes or bars.

The goals are 6 feet high, each with a horizontal cross-bar of the same length. The distance between the goals is arbitrary, though officially between 120 and 150 yards. There are no boundaries of play as in football, nor is there any rule relating to off-side. The object of the game is to score goals by catching the ball in the net of the crosse, running with it, and propelling it by means of the crosse into the goal.

Twelve players constitute a team, which is composed of six players constituting the defence, and designated goal, point, cover-point, third man, right defence, and left defence; and six constituting the attack, viz. centre, right attack, left attack, first home, second home, and third home.

As a rule a game covers four periods of twenty minutes each. The game is started by the centre of either side 'facing' in the centre of the field, and playing off as in the 'bully' of hockey.

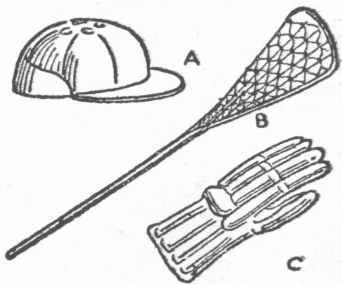
Goals can be scored only if the ball is propelled by the crosse into the goal-mouth. The ball is propelled by the foot or leg, but if it passes through the goal after such propulsion the score does not count. A player may check an opponent by placing his body so as to oppose his passage (*body-check*), but he may not deliberately charge or shoulder him, nor may he hold, strike, trip, or push him with his hand or crosse. Nor, save in the case of the goal-keeper alone, may he wilfully touch the ball with his hands.

Lacrosse is a swift, graceful game, strenuous though not excessively violent, and very attractive to spectators. For success, considerable skill and agility are called for, and speed is certainly a desideratum. Of recent date some of the best runners at Oxford and Cambridge have taken to the game as a form of training for their track events. But, as in most ball games, great speed alone will not get the better of technical skill, such as the capability of giving and taking short passes on the run.

In Canada the highest standard of play is demonstrated by professional teams. At the Olympic Games of 1908 (in London) an all-Canada amateur team was selected which was successful over the British team in a very close match. In addition to the inter-varsity contest, the most important lacrosse matches are played at Lord's cricket ground.

LACRYMATORY (lak'-), a small glass vessel found in ancient sepulchres, in which it has been supposed the tears of a deceased person's friends were collected and preserved with the ashes and urn. Tears were supposed to contain 'soul substance,' like saliva, hair, &c.

LACTANTIUS, Lucius Cæcilius Firmianus, a celebrated Father of the Latin Church, probably a native of Italy, and born about the middle of the third century. He lived for a long time at Nicomedia as a teacher of rhetoric, until Constantine the Great invited him to Gaul, and committed to his care the education of his eldest son Crispus. He died at Trèves about A.D. 325. His writings are character-



Lacrosse. A, Cap. B, Crosse. C, Gauntlet

ized by a clear and agreeable style. His *Divinarum Institutionum Libri VII* is particularly celebrated.

LACTIC ACID, or HYDROXY PROPIONIC ACID ($C_3H_6O_3$). There are two hydroxy propionic acids: α-hydroxy propionic acid or ethylidene lactic acid, $CH_3CHOHCOOH$, and β-hydroxy propionic acid or ethylene lactic acid, CH_2OHCH_2COOH. The former is produced by fermentation of milk-sugar, and is present in sour milk; it is also found in meat juices. On a large scale it is manufactured from starchy materials, which are converted by means of malt into maltose, and then fermented by introducing the lactic acid bacillus. A dilute solution of lactic acid is obtained; this is concentrated and used in calico-printing and in tanning.

Pure lactic acid is a colourless, strongly acid liquid which may be solidified, and then melts at 18° C. On examining lactic acid it is found that fermentation lactic acid does not affect plane polarized light, that is, it is optically inactive, whereas lactic

acid from meat juice is optically active, and rotates the plane of polarization to the right. This active acid is given the name *sarcolactic acid* or dextrolactic acid.

Ethylene lactic acid is also found in the juice of flesh, and is optically inactive. Several salts of fermentation lactic acid are industrially important, such as zinc lactate, iron lactate, and calcium lactate.

LACTINE, or **LACTOSE,** milk-sugar, ($C_{12}H_{22}O_{11}$), a sugar isomeric with cane-sugar, obtained by evaporating whey, filtering through animal charcoal, and crystallizing. It forms hard, white, semi-transparent crystals, which have a slightly sweet taste, and grate between the teeth. When it is boiled with dilute sulphuric acid, it yields glucose and galactose. *See* MILK.

LACTOM'ETER, an extensively used instrument for ascertaining immediately the specific gravity of milk. It is a modified form of hydrometer (q.v.), can be used only with milk, and consists of a graduated glass stem surmounting an expanded air-bulb, which carries underneath a smaller bulb weighted with mercury or small shot to keep the instrument upright in the milk. These three divisions are entirely separate from one another.

The graduated stem shows *lactometer degrees,* representing the second and third figures after the decimal in the specific gravity. ½° must be allowed for the *meniscus* on taking the reading, and the test must be made at 60° F., or between 50° and 70° F., a correction being made for temperature in the lactometer reading.

The rule is to add ·1 to lactometer reading, or·0001 to specific gravity for every degree above 60° F., and subtract for every degree below: e.g. lactometer reads 31; add ·5 for meniscus; corrected reading, 31·5. Specific gravity, 1·0315 at 65° F.; corrected to 60°F., this would read 32 or 1·032.—

—BIBLIOGRAPHY: C. W. Walker Tisdale, *Milk Testing*; H. D. Richmond, *Dairy Chemistry.*

LACTUCA'RIUM, or, **LETTUCE OPIUM,** the inspissated milky juice of several species of lettuce. It possesses slight anodyne properties, and is sometimes used as a substitute for opium. Lactucarium is a mixture of several compounds, the largest constitutent being lactucerin.

LADAKH', a province of Kashmir, India, comprising part of the valley of the Upper Indus and its tributaries. Lying at the back of the central Himálaya, it has an elevation of from 9,000 to 25,000 feet; area, about 45,762 sq. miles; capital, Leh. The climate is characterized by cold a excessive aridity. Of domes animals, the principal are poni asses, oxen, sheep (regularly used beasts of burden), goats, and dog The wool of the goat is the we known shawl-wool of Kashmir.

There is a considerable trans trade, Ladakh being naturally t great thoroughfare between Chine Tartary and Tibet on the one han and the Punjab on the other. Th trade is supervised by two Commi sioners, one native and one Britis Ladakh exports wool, borax, sulphu and dried fruits. The language Tibetan, the inhabitants are of th Mongol type, and the prevailing r ligions are Buddhism and Mahomm danism. Polyandry prevails. Po 186,700.

LAD'ANUM, a fragrant resinou gum which exudes from plants of th genus Cistus, such as the *Cistu creticus.* It is obtained chiefly i Crete, Cyprus, and certain parts o Asia Minor, and is highly prized i the East, where it is rolled into smal balls to scent the hands.

LADO, a town of the Anglo Egyptian Sudan, in the Bari country on the left bank of the Upper Nile It was founded by General Gordon i 1875 to take the place of Gondokor (about 10 miles above Lado) as a military station. Lado was for some time the head-quarters of Emin Pasha.

LAD'OGA, a lake of Russia, the largest fresh-water lake in Europe; length, 130 miles; mean breadth, 75 miles; average depth, 300 feet. It receives the waters of Lakes Onega, Sarina, and Ilmen through the Volkhov, &c., and discharges itself at its south-western extremity by the Neva.

Ladoga is ice-bound for the greater part of each year and even when clear, gales and violent storms make navigation dangerous for small craft. To remedy this, an elaborate canal system links up its shores with Leningrad and the Gulf of Finland. The Islands of Valamo and Konnevitz possess monasteries founded in A.D. 961 and 1393 respectively, and much visited by pilgrims. The fishing on the lake is important.

LADRONES, or **MARIANNE ISLANDS,** a group of seventeen islands in the North-West Pacific, all of volcanic origin and having some active craters in the northern group, which is uninhabited. The climate is good except for occasional typhoons; the soil is fertile, maize, tobacco, and sugar being produced, and the islands, densely wooded, are very picturesque.

The natives are mixed, Tagals, Caroline Islanders, &c., having re-

aced the original race. Discovered
r Magellan in 1521, the Ladrones,
:cepting Guam, were sold by Spain
) Germany on 1st Oct., 1899, for a
im of £840,000. Guam was handed
ver to America after the Spanish-
merican War of 1898, and is now a
)werful United States naval station.
he capital is Sipan. Area (excluding
uam), 225 sq. miles, and pop. (1930),
),530.

The remainder of the Ladrones
ere invested in 1914 by an Australian
)rce and by Japan, who now governs
iem by mandate of the League of
Jations, dated 17th Dec., 1920. Ad-
ministrative centre, Sipan. Pop. 3,638
natives) and about 2,000 Japanese.

LADYBIRD, the name of a number
f small beetles, common on trees and
)lants in gardens. The type-genus is
)occinella. Numerous species are
iative to Britain. They are of great
ervice to cultivators on account of
he number of aphides or plant-lice
vhich they destroy.

LADY DAY, the 25th of March, the
lay commemorating the Annuncia-
:ion of the Virgin Mary; one of the
:egular quarter-days in England and
Ireland. It is one of the immovable
festivals of the Roman Catholic and
Anglican Churches.

LADY-FERN, a species of polypod-
laceous fern, the *Athyrium Filix-
œfmina,* common in Great Britain.
It has bipinnate or tripinnate fronds
of delicate texture, and of a remark-
ably graceful plumy structure.

LADY'S-MANTLE (*Alchemilla vul-
gāris*), a British plant of the rose
family, with rather large seven- to
nine-lobed leaves (whence the name)
and small greenish-yellow flowers.

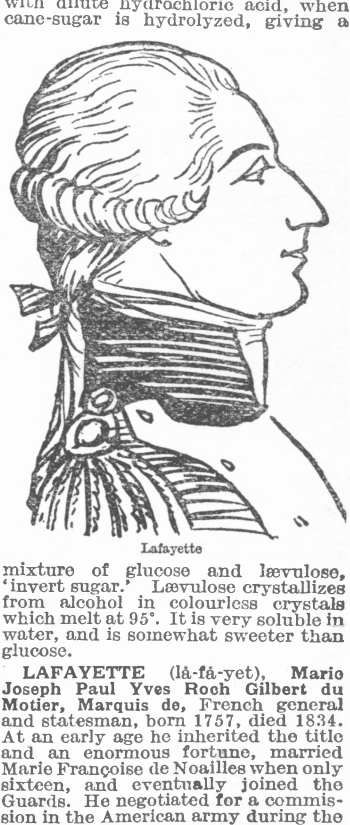
LADYSMITH, a town of Natal, on a
slope near Klip River, and on the
railway to Johannesburg. It is famous
for the long siege which it withstood,
under Sir George White, during the
South African War (30th Oct., 1899,
to 28th Feb., 1900). Pop. (Eur.) 3,659,

LADY'S-SLIPPER (Cypripedium),
a beautiful genus of orchideous plants,
with large inflated flowers, inhabiting
north temperate regions. *C. Calcĕolus,*
a very rare British plant, has a flower
consisting of large, spreading, red-
brown sepals and petals, and an
obovoid pale-yellow lip.

LADY'S TRESSES, a common name
for the British species of Spiranthes,
a genus of Orchids. The spike of
small, white, delicately scented
flowers bears some resemblance to a
plait of hair.

LAEKEN (lā'ken), a suburban dis-
trict of Brussels. In the church of
Notre-Dame is the crypt of the royal
family of Belgium. The royal summer
residence, burnt down and rebuilt in
1890, was enlarged in 1903. Pop.
30,438.

LÆVULOSE, FRUCTOSE, or
FRUIT SUGAR, ($C_6H_{12}O_6$), a sugar
isomeric with glucose but differing
from it in structure. Glucose belongs
to the class of sugars known as the
aldoses, whereas lævulose belongs to
the ketoses; glucose is dextrorotatory
and lævulose is lævorotatory. It is
found together with glucose in honey
and in many fruits, and may be ob-
tained from cane-sugar by boiling it
with dilute hydrochloric acid, when
cane-sugar is hydrolyzed, giving a



Lafayette

mixture of glucose and lævulose,
'invert sugar.' Lævulose crystallizes
from alcohol in colourless crystals
which melt at 95°. It is very soluble in
water, and is somewhat sweeter than
glucose.

LAFAYETTE (lå-få-yet), **Marie
Joseph Paul Yves Roch Gilbert du
Motier, Marquis de,** French general
and statesman, born 1757, died 1834.
At an early age he inherited the title
and an enormous fortune, married
Marie Françoise de Noailles when only
sixteen, and eventually joined the
Guards. He negotiated for a commis-
sion in the American army during the
War of Independence, and accepted
the appointment of major-general
(being then nineteen years of age).
Prohibited by Louis XV and warned
by his friends, Lafayette set off for

America and reached Philadelphia, where he was introduced to Washington.

He fought with the Americans and subsequently returned to France, where he was called to the Assembly of Notables (1787), and became a member of the States-General. On the fall of the Bastille (14th July, 1789) he was appointed commander of the Parisian National Guard, and saved the king and queen from the mob at Versailles. He endeavoured to discredit the Jacobins, and commissioners were sent to arrest him, whereupon he left France, but was arrested in Austria and confined (at Olmütz) until 1797.

During the consulate and subsequent reign of Bonaparte, Lafayette

Jean de Lafontaine

repeatedly refused office, but at the restoration in 1815 he took part politically in the Hundred Days.

In 1824 he visited the United States, where he was received with enthusiasm, and was voted by Congress 200,000 dollars and a township of land. In July, 1830, during the Revolution, Lafayette was again made commander of the National Guard of Paris, and materially assisted in elevating Louis Philippe to the throne. —BIBLIOGRAPHY: A. Bardoux, *La Jeunesse de La Fayette*; C. Tower, *The Marquis de La Fayette in the American Revolution*; G. Morgan, *The True Lafayette*.

LAFAYETTE, Marie-Madeleine de la Vergne, Comtesse de, French novelist, born 1632, died 1693. In 1655 she married Comte François de Lafayette, and her house became a place of meeting for the most distinguished men of her time, including La Rochefoucauld, Huet, Ménage, and Lafontaine. The most distinguished of her novels are *Zaïde, La Princesse de Clèves*, and *La Princesse de Montpensier*.

LA FAYETTE, a town of the United States, in Indiana, on the Wabash River and Wabash and Erie Canal, and at the intersection of several railways. It is the seat of the State agricultural college, and has a number of miscellaneous manufactures. Pop. (1930), 26,240.

LA FÈRE, a town of France, department of Aisne, at the confluence of the Serre and the Oise, 10 miles S. of St. Quentin. Captured by the Germans in 1914, it remained in their possession til 13th Oct., 1918, when it was retaken by the French.

LAFONTAINE (lá-foṇ-tān), **Jean de,** French poet and fabulist, born at Château-Thierry 8th July, 1621, died at Paris 13th April, 1695. He began to study for the priesthood, but forsook this career. His poetic talent was awakened by his reading of Malherbe, and in 1658 he dedicated a poem, *Adonis*. to Fouquet. In 1662 he was invited to Paris by the Duchesse de Bouillon.

He was intimate with Molière, Boileau, Racine, and all the first wits of Paris, by whom he was much beloved for the candour and simplicity of his character. But he was no favourite with Louis XIV, who even hesitated to confirm his nomination to the French Academy.

The first volume of his *Contes* (Tales) appeared in 1664, a second in 1671. They are full of fine touches of genius, but are grossly indecent. Of his *Fables* (in which animals are represented speaking and acting) innumerable editions have been printed, and it is through them that he is universally known.—BIBLIOGRAPHY: E. Faguet, *Jean de La Fontaine*; Taine, *La Fontaine et ses Fables*.

LAGERLÖF, Selma Ottiliana Louisa, Swedish writer, born in 1858. Her *Gösta Berlings Saga* (1891) brought her into the front rank of contemporary Swedish authors. She gained the Nobel Prize for literature in 1909, and in 1914 was the first woman to be elected a member of the Swedish Academy. Among her works are: *Jerusalem*, a two-part novel (1901–2); *The Outcast* (1920); *The General's Ring* (1925); and *Anna Svärd* (1928).

LAGGING is the general name given to the process of preventing the loss of heat from hot surfaces. The term is also often used for the material employed. Perhaps the most scientifically perfect method is the use of a vacuum jacket, an example of which is to be found in the thermos flask invented by Professor Dewar. This flask is a double-walled vessel made of

lvered glass, and the space between he outer and the inner glass shells is acuous. The appliance possesses reat powers of retaining heat, but its efect is that it is fragile.

The principle upon which the acuum flask works is this—as there s no material round the outside of the nner vessel containing the hot liquid, his vessel can only lose its heat by adiation, and since the wall of the uter shell which surrounds it is ighly polished, the radiation which alls on this polished wall is at once eflected back into the inner vessel rom which it came, so that the amount of heat which penetrates the outer shell and escapes is very small.

In engineering work the properties desirable in a lagging material are that it should have a low heat conductivity, be non-inflammable, resist deformation under vibration, change of temperature, or the action of water and steam. A variety of materials having these properties to a greater or less extent are in use, such as slag wool, paper, asbestos, compressed cork, magnesia, and kieselguhr.

A number of proprietary preparations of good insulating properties are available. A typical example consists of about 85 per cent of light magnesium carbonate and 15 per cent asbestos fibre.

A steam-pipe carrying steam at 400° F. was tested unlagged and with different thicknesses of this covering. When unlagged the heat loss was B.Th.U.'s per square foot per hour. With a thickness of 1 inch of lagging the loss became about 150 B.Th.U.'s per square foot per hour, and with 2 inches about 100, so that a thickness of about 2 inches reduces the heat loss to one-tenth of its full value when the pipe is unlagged.—BIBLIOGRAPHY: C. R. Darling, *Heat for Engineers*, and article in *Engineering*, 22nd Sept., 1911.

LAGOS, a seaport town in the south of Portugal, province of Algarve. Admiral Boscawen defeated a French fleet at Lagos in 1759, and the coast in the vicinity was the scene of a desperate battle between Admiral Jervis (Earl St. Vincent) and a large Spanish fleet in 1797, the latter being destroyed. Pop. 10,000.

LAGOS, a seaport, island, and district of Southern Nigeria. After purchase by Great Britain in 1861 Lagos was augmented by the purchase or annexation of further land, and in 1886 was made a colony and protectorate. In 1906 it was united to Southern Nigeria, which was in 1914 merged in the Colony and Protectorate of Nigeria. It is now the seat of the Central Government of Nigeria.

The town is the principal port of Nigeria, and with the building of moles and a deep channel over the bar ocean-going steamers will find at Lagos an average and readily accessible anchorage. There are engineering- and repair-shops and slipways, and a wireless station was established in 1913. A railway running from Lagos has an extension to Kano (q.v.), over which a boat-train having *wagon-lit* and restaurant cars is run each week.

The Governor of the district is President of the Legislative Council. There is a mission grammar school and a Government higher-grade school in the town. The town is electrically lit, has a race-course, water-supply, Government house, and an extensive cottage hospital. Pop. (town), 100,000. —The district has a pop. of over 2,250,000, including about 1,000 Europeans.

LAGRANGE (lă-grănzh), **Joseph Louis**, French mathematician, was born at Turin 25th Jan., 1736, died at Paris 10th April, 1813, and was buried in the Panthéon. He had a natural bent for mathematics, and when scarcely nineteen years of age was appointed mathematical professor in the artillery school of Turin. In 1764 he obtained the prize of the Academy of Sciences in Paris for a thesis on the libration of the moon, and in 1776 for another on the theory of the satellites of Jupiter.

About this time he made a visit to Paris, where he made the acquaintance of D'Alembert, Clairaut, Condorcet, and other savants. Soon after his return he received an invitation from Frederick the Great, to whom he had been recommended by D'Alembert, to go to Berlin as Director of the Academy, a post he held for twenty years.

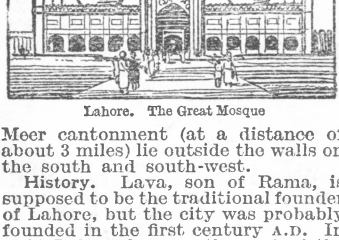
After Frederick's death (1786) the persuasion of Mirabeau and the offer of a pension induced him to settle in Paris. He was the first professor of geometry in the Polytechnic school, and was the first inscribed member of the Institute. In 1794 he was appointed professor in the newly established Normal School (École Normale Supérieure), at Paris (1794), as well as in the École Polytechnique.

Napoleon bestowed upon him distinguished tokens of his favour, and as member of the Senate, grand officer of the Legion of Honour, and count of the empire, Lagrange saw himself surrounded with every external honour. But he remained as modest and retiring as ever, devoting himself with the same zeal and industry to his studies. The most important of his works are his *Mécanique analytique* (1788);

Théorie des fonctions analytiques (1797); *Résolution des Équations numériques* (1798); *Léçons sur le calcul des fonctions*; and *Essai d'Arithmétique politique.*

LA HARPE (lä ärp), **Jean François de,** a French dramatic poet, critic, and philosopher, born at Paris 1739, died 1803. His work *Lycée ou Cours de Littérature ancienne et moderne* constitutes his most durable title to fame.

LAHORE', a city of India, capital of the Punjab, on the Ravi. The city proper covers an area of 640 acres, and is surrounded by a brick wall 16 feet high, flanked by bastions. Among the prominent buildings are the fort, the palace of Jehanghir, the Pearl Mosque, the Great Mosque, the mausoleum of Ranjit Singh, Montgomery Hall, the Punjab University, Oriental College, and Mayo Hospital. The European quarter and the Meean



Lahore. The Great Mosque

Meer cantonment (at a distance of about 3 miles) lie outside the walls on the south and south-west.

History. Lava, son of Rama, is supposed to be the traditional founder of Lahore, but the city was probably founded in the first century A.D. In 1524 Lahore became the seat of the Mogul Empire, and it reached its greatest splendour during the reign of Akbar (1556–1605). Before passing into the hands of the British it was the capital of the Sikhs. Pop. (1931), 429,747.—Lahore division has an area of 12,387 sq. miles, and a pop. of 4,656,629.

LAIBACH (lī'bäh), now **LYUBLYANA,** a town of Yugoslavia, formerly in Austria, and capital of Carniola. It is situated 35 miles north-east of Trieste, on the river of the same name. Its principal buildings are the cathedral of St. Nicholas, with fine pictures, frescoes, and carvings; the old Gothic town house; the old castle; the lyceum and other educational institutions. It manufactures woollen and cotton goods, and paper. Pop. (1931), 59,768.

LAING, David, Scottish antiquary, born in Edinburgh 20th April, 1793, died there 18th Oct., 1878. He became secretary of the Bannatyne Club, a position which he retained during the thirty-eight years of the society's existence. In 1837 he was appointed librarian to the Society of Writers to the Signet, an office which he held till his death. He was in turn treasurer, secretary, vice-president, and foreign secretary to the Scottish Society of Antiquaries. He published the works of John Knox, with valuable notes; *Select Remains of the Early Popular Poetry of Scotland*; editions of Dunbar's, Henryson's, and Sir David Lyndsay's poems, and of Wyntoun's *Cronykill.*

LAING, Malcolm, Scottish historian, born 1762, died 1818. He was called to the Edinburgh Bar in 1785. His best-known work is the *History of Scotland from the Accession of James VI to the Reign of Queen Anne*, with a Dissertation proving the participation of Mary Queen of Scots in the murder of Darnley.

LAING'S NEK, or **LANG'S NEK,** a defile in Natal, immediately north of Majuba, where, in 1881, a small British force under Sir George Colley was cut up by the Boers.

LAISSER-FAIRE (lā-sā-fār). For centuries the European nations regarded their colonies as 'possessions' to be made to yield a profit. So the colonial produce must go to the home market only, and the colonial needs must be supplied from the home market. It was against this theory that Britain's American colonies rebelled in 1776. "We are not allowed," they complained, "to make even a horseshoe."

A similar endeavour to secure economic advantage by State regulation governed commercial policy from the break-up of the mediæval system until the end of the eighteenth century. Cromwell's Navigation Acts did undoubtedly build up the British mercantile marine at the expense of the Dutch (and of incessant war), while his great French contemporary, Colbert, was extremely active in the promotion of State measures *pour faire aller le commerce* ('to make trade go'). Their efficacy was doubtful, and it was to M. Colbert that a French merchant, M. le Gendre, said *laissez nous faire*, 'let us alone.'

Against these interventions of the State in the regulation of commerce and manufacture, and against State-erected and State-favoured monopolies and privileges, the doctrine of *laisser-faire, laisser-passer* was invoked by the physiocrats in France and by Adam Smith in this country, and its application was generalized into the theory that the best government is that which governs least.

At a later stage the theory was applied by Bentham and the utilitarians

defence of the rights of private property and the independence of private enterprise. The theory was supported by the Manchester school, whose great leaders, Richard Cobden and John Bright, viewed factory legislation with doubt and trade unionism with hostility. It is now recognized that *laisser faire* implies the domination of the strongest; "between men who are unequal in material wealth," as Arnold Toynbee said, "there can be no freedom of contract."

The whole tendency of modern times is away from *laisser-faire*: factory and public health legislation, Education Acts, food inspection, municipal trading, Truck and Workmen's Compensation Acts, Trade Boards Acts, and a host of others bear witness to the modern repudiation of 'enlightened self-interest' as a sufficient directive of social and economic activities. *See* INDIVIDUALISM; LABOUR LEGISLATION.

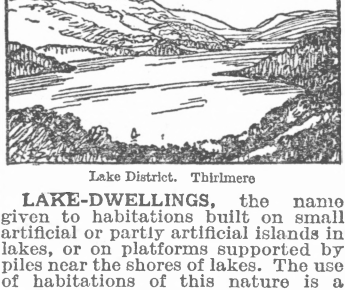
LAKE, Gerard, Viscount, British general, born 1744, died 1808. He entered the army in 1758, and served in the Seven Years' War, in America in 1781, and in Holland from 1793 to 1794. He attained the rank of general, and was commander-in-chief in Ireland during the troubles of 1797–8, and in India during the Marathi (Mahratta) War (1803), which he brought to a brilliant conclusion. He defeated Holkar in 1805, returned to England in 1807, was made viscount, and appointed Governor of Plymouth, where he died.

LAKE, a sheet or body of water occupying a basin formed by a depression of the lithosphere (earth crust) and not directly supplied with water by sea or ocean. Lakes may be of several varieties, and these variations may be classified in one of several different ways, either geologically or according to the nature of the drainage system of which they form a part.

For convenience all lakes may be divided into five different classes: *crater lakes, tectonic lakes, barrier lakes, glacial lakes,* and *dissolution lakes.* Not infrequently they can be classified under several headings, e.g. the Great Lakes are partly water-eroded, partly tectonic, and partly glacial, such complications tending towards increased difficulty in simplifying classification. The majority of the mighty rivers, such as the Amazon and the Mississippi, find their source in small tarns fed by springs and by rains, such as Lake Ithasca, which is the source of the latter river.

LAKE DISTRICT, a district in the north-west of England, famed for its picturesque and varied scenery, embracing parts of Cumberland, Westmorland, and the north-west portion of Lancashire, and extending about 30 miles north and south, and about 25 miles east and west. The district attracts large crowds of visitors, and the whole of it can be traversed in a week.

The principal features of the scenery are lakes, mountains, and streams. The lakes comprise Buttermere, Ullswater, Derwentwater, Thirlmere, Grasmere, and Windermere, besides others. The highest peaks are Scafell Pike (3,210 feet), Scafell (3,162 feet), Helvellyn (3,118 feet), and Skiddaw (3,054 feet). There are some waterfalls or 'forces' (same word as Norwegian *foss*), of great beauty.—BIBLIOGRAPHY: W. Wordsworth, *A Guide through the District of the Lakes*; H. D. Rawnsley, *Round the Lake District.*

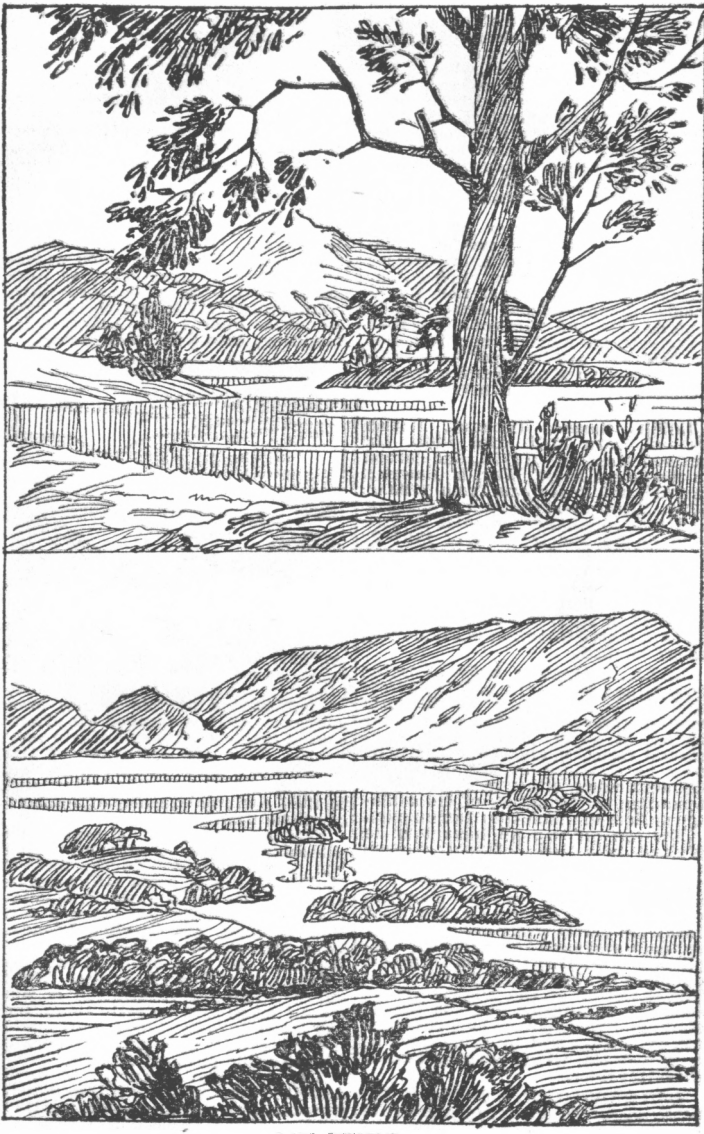


Lake District. Thirlmere

LAKE-DWELLINGS, the name given to habitations built on small artificial or partly artificial islands in lakes, or on platforms supported by piles near the shores of lakes. The use of habitations of this nature is a subject which has engaged the attention of archæologists and others very largely since the discovery of the remains of a lake-dwelling in Ireland in 1839, of similar ones in Switzerland in 1854, and subsequently of numbers of others elsewhere.

The archæological interest thus attaching to these lacustrine remains has drawn attention to the fact of similar dwellings being still used in various parts of the world, in Russia, the Malay Archipelago (Borneo and New Guinea), the Caroline Islands, Lake Maracaybo in Venezuela, New Zealand, and in a modified form in some parts of Central Africa. They afford a striking illustration of the spread of culture in early times, for the Swiss lake-dwellings were made many centuries ago, probably during the Neolithic phase of culture.

The first who is known to have described lake-dwellings is Herodotus, who mentions certain dwellings of this kind on Lake Prasias in Thrace as being approached by a narrow bridge,



LAKE DISTRICT
Top, Grasmere Below, Derwent Water

each habitation having a trap-door in the floor, giving access to the water beneath, through which fish were caught. A great number of these *pfahlbauten* (pile structures) have been discovered in the Swiss lakes, some belonging to the Iron Age, some few even to Roman times; but the greatest number appear to be divided in about equal proportions between the Stone and Bronze Ages.

The Celtic lake-dwellings, called *crannoges*, are more or less artificial islands composed of earth and stones strengthened by piles, those of Ireland being of a much later date than those of Switzerland, and are frequently noticed in early history as strongholds of petty chiefs. Similar structures are not infrequent in Scotland.

The relics found in these buildings have thrown much light on prehistoric man, large populations having occupied these pile-dwellings during extended periods of time. Dr. Keller of Zürich first described the lake-dwellings of the European continent, and his account was translated into English.—BIBLIOGRAPHY: F. Keller, *The Lake Dwellings of Switzerland and other parts of Europe*; Robert Munro, *The Lake Dwellings of Europe*, and *Ancient Scottish Lake Dwellings*.

LAKE, LADY OF THE. *See* LANCELOT OF THE LAKE.

LAKE OF THE WOODS, a lake partly within South-Eastern Ontario, Canada, and partly in Minnesota, United States. It is upwards of 70 miles in length, has an extremely irregular form, and a coast-line of about 250 miles. It is studded with numerous wooded islands. Rainy River, the principal feeder of the lake, flows out of Rainy Lake, Minnesota, and enters the Lake of the Woods at its south-eastern extremity. It discharges from the north side by Winnipeg River, flowing to Lake Winnipeg.

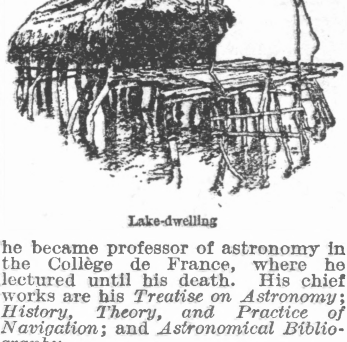
Kenora, at the northern outlet of the Lake of the Woods, became a growing town through new gold-fields in this region and through the water-power of a thousand lakes pouring into Winnipeg River. It has also flourmills and sawmills, and is a favourite summer-resort.

LAKHIMPUR (*lak*-him-pör'), a British district of India, occupying the extreme eastern portion of Assam; area, 3,757 sq. miles. It contains valuable forests, flourishing tea plantations, coal-mines, oil-wells, &c. Pop. 588,000.

LAKSHMÎ (from *laksa*, sign, token, fortune), in Hindu mythology, the wife of Vishnu. She is said to have sprung, Aphrodite-like, in full perfection from the froth of the ocean. According to other accounts, Lakshmi is supposed to have sprung from a lotus, and is therefore often called Padma, or goddess of the lotus, a flower she is always represented as holding. She is the Hindu Venus, the Ceres or goddess of abundance and prosperity. Flowers and grain are the offerings she most commonly receives.

LALANDE (lá-länd), **Joseph Jerome le Français de,** French astronomer, born at Bourg-en-Bresse, department of Ain, 11th July, 1732, died in Paris 4th April, 1807. He devoted himself to mathematics and astronomy, and was sent by the Academy in 1751 to Berlin to determine the parallax of the moon, while Lacaille went with the same object to the Cape of Good Hope.

He was elected to the Academy of Sciences, Paris, in 1753, and in 1762



Lake-dwelling

he became professor of astronomy in the Collège de France, where he lectured until his death. His chief works are his *Treatise on Astronomy*; *History, Theory, and Practice of Navigation*; and *Astronomical Bibliography*.

LALANG, a coarse grass found in barren parts of the Malay Archipelago.

LALLY-TOLLENDAL, Thomas Arthur, Comte de, a French general, born in Dauphiné 1702, of Irish parents, his father having followed the fortunes of James II, and was beheaded 6th May, 1766. Trained to arms, he was made brigadier on the field of Fontenoy. He accompanied the Pretender to Scotland in 1745, and in 1756 he was made Governor of Pondicherry, war having been declared at that time between France and England.

Defeated by Sir Eyre Coote at Wandiwash, he surrendered Pondicherry in 1761, and was brought prisoner to England. Within a month he was released on parole, and

returned to France, where he suffered imprisonment for upwards of two years before he was brought to trial, condemned, and executed (1766) for treachery. His son, supported by Voltaire, obtained in 1778 a complete authoritative vindication of his father's conduct.—Cf. G. B. Malleson, *The Career of Count Lally*.

LA'MAISM, a system of Buddhism maintained by the lamas and common throughout Tibet and Mongolia. It dates from the seventh century, and the name is derived from the Tibetan word *blama*, Superior One. All Buddhist priests are called lamas, and their gigantic and ubiquitous monasteries and nunneries are styled 'lamaseries.' The highest object of worship is Buddha, the founder of the religion and the principal saint; the remaining saints are those common to Buddhism reinforced by a miscellany of canonized religious teachers and pious men.

The Lamaist hierarchy resembles somewhat that of the Roman Catholic Church; auricular confession and litanies are points in common. The Dalai-Lama or Grand-Lama is the joint god and king of Tibet, and lives in splendid isolation in the colossal Potala overlooking Lhasa. Almost equally exalted is the Teshu or Bogodo Lama of Mongolia, in whom Gautama Buddha is also supposed to be incarnate. Below these gods are certain incarnations of saints, and then follow in order of precedence founders of lamaseries, Buddhistic monasteries, and those of the lower ranks who are distinguished by talents or learning.

When either of the two lamas decides to allow his soul to migrate, his place may be filled according to directions given by himself before his (death) change, stating into what family he purposed transmigrating. Lamas never actually 'die'; they are reincarnated; they undergo a voluntary process of transmigration, but they dread the form in which they may be represented, and, as a consequence, no living thing is ever voluntarily killed.

Should the deceased Grand-Lama fail to appoint a successor, the surviving Grand-Lama chooses, from among the boys born at the hour of his brother's departure, a number of infants into whom the god's soul may have migrated. From these selected infants the future Grand-Lama is chosen by lot, and is carefully tutored in the art of being a god until his majority at the age of eighteen years, when he becomes supreme in all things spiritual or temporal affecting his domains.—Cf. L. A. Waddell, *The Buddhism of Tibet or Lamaism*.

LAMARCK, Jean Baptiste Pierre Antoine de Monet, Chevalier de, French naturalist, born in Picardy 1st Aug., 1744, died at Paris 18th Dec. 1829. He was the founder of invertebrate palæontology, as Cuvier was the founder of vertebrate palæontology. His first work was *Flore française*, in which he advanced a new system of botanical classification, which was soon, however, abandoned for the natural system of Jussieu. Other chief works are *Philosophie zoologique*, in which he promulgated a theory foreshadowing what is now known as the law of evolution; *Histoire naturelle des animaux sans vertèbres*, and *Tableau encyclopédique de la botanique*.—Cf. A. S. Packard *Lamarck: the Founder of Evolution*.

LAMARCKISM, the evolutionary theory propounded by the French naturalist Lamarck (1744–1829), who was one of the first to deny the immutability of species, to establish the facts of variation, and to emphasize the importance of the environment (*la monde ambiant*).

He formulated the two following 'laws of nature,' which express his views in summary form: (1) "In every animal that has not passed beyond the term of its development, the frequent and sustained use of any organ strengthens it, develops it, increases its size, and gives it strength proportionate to the length of time of its employment. On the other hand, the continued lack of use of the same organ sensibly weakens it; it deteriorates, and its faculties diminish progressively, until at last it disappears." (2) "Nature preserves everything that she has caused the individual to acquire or to lose by the influence of the circumstances to which the race has been for a long time exposed, and consequently by the influence of the predominant use of certain organs (or in consequence of their continued disuse). She does this by the generation of new individuals, which are produced with the newly acquired organs. This occurs, provided that the acquired changes were common to the two sexes, or to the individuals that produced the new forms."

Lamarck believed, for example, that the long neck of the giraffe was gradually evolved by the action of these laws. He supposed that by constant efforts to reach the foliage of trees the necks of individuals became somewhat longer, each successive gain in length being transmitted to the next generation.

There can be no doubt that individual organisms adapt themselves in various ways to their surroundings, such adaptations being technically known as 'acquired characters' or

accommodations. But the researches of Galton, Weismann, and many others have resulted in the generally accepted conclusion that such acquired characters are *not* inherited. According to these authorities, only such variations as take place in the germ-cells can be transmitted to offspring.

Although Darwin rejected the conclusions of Lamarck, he attached a certain amount of evolutionary importance to the effects of use and disuse, but most modern authorities repudiate Lamarckism altogether. The matter is by no means finally settled, for it is conceivable that some acquired characters may react upon the germ-cells, stimulating them to variation in the same direction.

A Lamarckian school still exists, and also a modification known as Neo-Lamarckism, which asserts that a changed environment, acting on a succession of generations, may gradually bring about structural modification of adaptive character, and this necessarily involves transmission from parent to offspring. Definite proof or disproof, one way or the other, is extremely difficult.

Many persons are reluctant to give up Lamarckism because they like to believe that intellectual advances made by parents can be transmitted to their children. It is, however, more than doubtful that the hereditary make-up of a new-born baby has been advantageously modified by the mental advances achieved by his parents.—BIBLIOGRAPHY: F. W. Hutton, *Darwinism and Lamarckism, Old and New*; S. Butler, *Evolution, Old and New*.

LAMARTINE (lȧ-mȧr-tēn), **Alphonse Marie Louis de Prat de**, French poet and statesman, born at Mâcon, in Burgundy, 1790, died in Paris, 1869. By his first production, *Méditations poétiques* (1820), he at once obtained a high place among the poets of the day. In 1820 he was attached to the legation at Naples, and married a rich English lady, Eliza Marianna Birch. The *Nouvelles méditations poétiques* (1823) and the *Harmonies poétiques et religieuses* (1828) established his poetic fame, and obtained for him admission into the French Academy (1830).

After the Revolution of July he travelled in the East, and on his return published *Voyage en Orient, souvenirs, impressions, pensées et paysages* (Paris, 4 vols., 1835). During his absence he had been elected a member of the Chamber of Deputies, and thenceforward his career was as much political as literary. In 1847 he published his *Histoire des Girondins* (Paris, 8 vols.), in which he manifested strong Republican leanings.

After the February Revolution of 1848 he became a member of the Provisional Government in the capacity of Minister of Foreign Affairs. After the Insurrection of June, 1848, he lost his popularity, and in 1851, withdrew from public life. His *Mémoires* appeared in 1871. His works appeared in 40 vols. during 1860–6.—BIBLIOGRAPHY: Ch. de Pomairols, *Lamartine*; E. Deschanel, *Lamartine*; Rod, *Lamartine*; F. Brunetière, *Évolution de la Poésie lyrique*; E. Sugie, *Lamartine*.

LAMB, Charles, English essayist and humorist, was born on the 10th Feb., 1775, and died on the 29th Dec., 1834. His father was clerk to Samuel Salt, a bencher of the Inner Temple, who obtained for Lamb a nomination to Christ's Hospital. Lamb remained there for seven years (1782–9), and while there formed a friendship with Coleridge which had an abiding influence on his life and work.

Charles Lamb was employed for a short time in the South Sea House, but in 1792 he became a clerk in the accountant's office of the India House, remaining there for thirty-three years. In 1796 occurred the terrible family tragedy which was destined to mould the whole of Lamb's life. There was a certain amount of mental instability in the Lamb family, inherited from their mother. Mary Lamb, who was ten years older than her brother Charles, in a fit of acute mania stabbed her mother to the heart.

Lamb at once assumed full responsibility for the custody of his sister instead of allowing her to be sent for life to a public asylum, and devoted the whole of his life to caring for her. At intervals her mental disease became acute, and she had to be confined, but as a rule the brother and sister lived together, changing their lodging frequently when the nature of Mary's malady became known.

Lamb's earliest poems were published in a volume of poems by Coleridge in 1796. In 1798 Lamb and a friend named Lloyd published a joint venture under the title of *Blank Verse*. This volume contains the well-known *Old Familiar Faces*. In the same year he published his prose romance *The Tale of Rosamund Gray*.

Lamb became a devoted student of the Elizabethan dramatists, and their influence is plainly to be seen in his *John Woodvil*, which was published in 1802. As a drama this play has nothing to recommend it, but it has many pleasing passages reminiscent of Fletcher and Massinger.

In 1806 Lamb again experimented with the drama, writing this time a farce called *Mr. H.*, which was pro-

duced at Drury Lane. It was a complete failure. It is a very slight piece which turns upon the hero trying to keep his unpleasant name of Hogsflesh from becoming known. In 1807 Charles and Mary Lamb combined to write their *Tales from Shakespeare* for William Godwin's Juvenile Library. Mary was responsible for the comedies and Charles for the tragedies. This book was very successful, and its reception encouraged them to write two other books for children, *Mrs. Leicester's School* (1807) and *Poetry for Children* (1809). Lamb also wrote *The Adventures of Ulysses*, based upon Chapman's translation of Homer.

It was not until 1820, however, that Lamb began to write the series of essays which made his reputation as an essayist and humorist. His reputation as a critic had already been

Charles Lamb

made in 1808 by his *Specimens of Dramatic Poets*, a selection of choice passages from his favourite Elizabethans, illuminated by brief notes which display a rare insight, and which are couched in felicitous language.

The Essays of Elia were originally contributed to *The London Magazine*, the first, in which Lamb embodied some of his recollections of the South Sea House, appearing in Aug., 1820. Lamb took the name of 'Elia' from a foreigner of that name who had been a clerk with him in the South Sea House. A collected edition of the essays was published in 1823; the series ceased to appear in *The London Magazine* in 1825, and *The Last Essays of Elia* were collected in a second volume in 1833.

Early in 1825 Lamb retired from the India House with a pension of £450 a year. His sister's health and, indeed, his own became gradually worse. He was deeply affected by the death of Coleridge in the summer of 1834, and in the following December he fell and cut his face; erysipelas supervened, and he died after a short illness. Mary Lamb survived until May, 1847.

Lamb is one of the best-loved of English men of letters. His quaint humour, his tenderness, his devotion to his sister, and his loyalty to his friends set him in a place apart. His style is very closely modelled on that of the Elizabethans, especially Burton; but he wrote naturally in this way, which would seem an affectation in other writers.

As a critic Lamb was a pioneer, and still remains unrivalled for his succinct criticisms of the Elizabethans. But he is chiefly loved for himself, something in the way in which Horace is loved. He has revealed most completely and most modestly his own charming personality, and his essays are read more on account of that revelation than because of their style, their wisdom, or even their lambent humour.—BIBLIOGRAPHY: A. Ainger, *Charles Lamb* (English Men of Letters Series); E. V. Lucas, *The Life of Charles Lamb*; P. Fitzgerald, *Charles Lamb: his Friends, his Haunts, and his Books*; W. C. Hazlitt, *Mary and Charles Lamb*.

LAMBAYEQUE (lăm-bā-yā'kā), a coastal department of Northern Peru; area, 4,614 sq. miles. There has been no census since 1876, although an Act of the Peruvian Congress of 30th Oct., 1920, has authorized the Executive to proceed with an enumeration. The chief town is Chiclayo, connected by rail with Eten and Piata on the coast. The district is important as the sugar-producing area of Peru, and Chiclayo lies in the cotton belt. Pop. 14,0000.

LAMBERT, Daniel, noted for his extraordinary size, was born in Leicester 1770, died at Stamford 21st July, 1809. He was exhibited in London and the principal towns of England, and at the time of his death was 5 feet 11 inches in height, weighed 739 lb. (over 52½ stone), and measured 9 feet 4 inches round the body, and 3 feet 1 inch round the leg.

LAMBERT, John, Parliamentary general during the English Civil War, born at Kirkby Malhamdale, Yorkshire, 1619, died in 1694. He entered the Parliamentary army under Fairfax, was colonel at Marston Moor, and major-general in the war in Scotland. He took the lead in the council of officers who gave the protectorate to Cromwell, but he afterwards fell into disgrace, and was deprived by Cromwell of all his commissions, though a

ension of £2,000 was allowed him for ast services. He headed the con- deracy which deposed Richard romwell, and in 1660 set out for the orth to encounter Monk, but was eserted by his troops, seized, and ommitted to the Tower.

At the Restoration he was excepted rom the act of indemnity, brought to rial, and condemned to death, but ad his sentence commuted to banish- nent to Guernsey. In 1666 a plot for is escape was discovered, and in 667 he was removed to the Island of St. Nicholas, in Plymouth Sound, where he died.

LAMBERT'S PINE (*Pinus Lambertiana*), a North American pine growing in California, and sometimes reaching the height of 300 feet. It yields, when burned, a sugary substance known as Californian manna. The leaves are in fives; the cones are 14 to 18 inches long, and contain edible seeds.

LAMBÈSE, a town of Algeria, department of Constantine. It is the site of the ancient Lambæsa, which would appear to have been established in the time of Hadrian as the headquarters of the third Legion (Augustan), but fell into decay before the advent of Christianity, and no Christian inscriptions are to be found among the ruins.

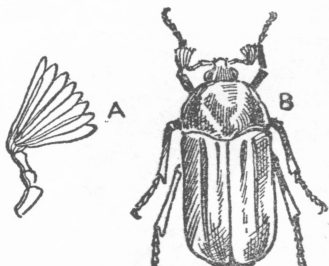
LAM'BETH, one of the twenty-eight boroughs of the county of London, famous for its potteries and the site of many historical and notorious buildings. Lambeth Palace has been, since the thirteenth century, the official residence of the Archbishops of Canterbury, and contains a library of some 30,000 volumes and valuable MSS. Every ten years the palace becomes a gigantic conference hall, where all the Anglican bishops assemble to discuss the policy and management of the Church; this is known as the **Lambeth Conference.** The last was held in 1930. Among other famous buildings in Lambeth are: the Union Jack Club, Waterloo Station, St. Thomas's Hospital, and Brixton Prison. Pop. (1931), 296,162.

LAMBETH ARTICLES, a series of nine articles drawn up by William Whitaker and others in 1595, embracing the most pronounced doctrines of Calvinism. The articles, concerning the doctrines of predestination, justification, and free-will, were approved by Archbishop Whitgift, but were rejected by the Queen and the Parliament, and again at the Hampton Conference, 1604.

LAMELLIBRANCHIATA (-brang-ki-ā'ta), or **PELECYPODA,** a class of Mollusca, represented by the oysters, mussels, cockles, &c., which are distinguished by the possession of a bivalve shell composed of right and left valves; and there is no rasping organ, and most species possess a laterally flattened muscular foot, by which burrowing in sand, mud, &c., is effected. There is, however, no foot in fixed forms, such as oysters.

LAMELLICORNES (-nēz), an extensive series of beetles, including the Cockchafer, May-bug, Rosechafer, Dung Beetle, &c.; named from the lamellated club in which the antennæ terminate.

LAMELLIROS'TRES, a group instituted by Cuvier to include the ducks, mergansers, &c., birds distinguished by the flat form of the bill, which is invested by a soft skin, and



Lamellicornes. A, Antenna of Cockchafer. B Cockchafer

provided at the edges with a set of transverse plates or 'lamellæ,' through which the mud, in which these birds grope for food, is sifted or strained.

LAMENNAIS (lá-men-ā), **Hugues Felicite Robert de,** French philosopher and publicist, who wrote on religion and politics, born at St. Malo, Brittany, on 16th June, 1782, died in Paris 27th Feb., 1854. He was ordained priest in 1816, and first attracted attention by his apology for Roman Catholicism, the *Essai sur l'indifference en matière de religion.* In 1824 he declined the offer of a cardinal's hat, and the following year published a work favouring ultramontane doctrines, *La religion consideree dans ses rapports avec l'ordre civil et politique.*

From this time he began to preach the separation of Church and State, and on the outbreak of the July Revolution (1830) he became a convert to the dogma of the sovereignty of the people. In September of that year he began to publish his *L'Avenir,* which was in 1832 condemned by the Pope and suppressed.

In 1834 he finally revolted from Rome in his *Paroles d'un Croyant* (Words of a Believer). This book, which produced an almost unexampled sensation, passed in a few years through more than 100 editions, and was translated into almost all living languages. It was condemned by the Pope, and Lamennais answered by the *Affaires de Rome*.

His subsequent works were all extremely democratic, and he gradually became both atheist and socialist. At the Revolution of 1848 he became a member of the National Assembly, but after the *coup d'état* he lived in strict retirement.—BIBLIOGRAPHY: Sainte-Beuve, *Portraits Contemporains*; P. Janet, *La Philosophie de Lamennais*; W. Gibson, *The Abbé de Lamennais and the Liberal Catholic Movement in France*.

Lammergeier

LAMENTATIONS, the name given in the authorized version of the Scriptures to a liturgical poem made up of five distinct elegies. They appear in the Hebrew canon with no name attached, but ancient tradition, internal evidence, and a prefatory verse which appears in the *Septuagint* point to the authorship of Jeremiah. The first four of the dirges are alphabetical acrostics, successive verses, or in chap. iii successive sets of three verses, beginning alphabetically. Chap. v is not in acrostic form. According to Josephus, Jerome, and also some modern critics, these poems were written on the death of King Josiah (cf. 2 *Chron.* xxxv, 25), but the contents of the book itself plainly show that a national calamity—the destruction of Jerusalem and the overthrow of the Judean state by the Chaldeans—is referred to.

LA METTRIE, Julian Offray de French physician and materialist born at St. Malo in 1709, died in 1751. He studied theology at Jansenist schools and medicine in Paris and Rheims, fought at Dettingen and Fontenoy, and was severely wounded. He taught that the soul perishes with the body, and that physical phenomena are the result of organic changes of the brain. Expelled from France for his materialistic views, he was well received by Frederick the Great, who appointed him court reader. His works include: *Histoire naturelle de l'âme*; *L'Homme Machine*; *L'Homme plante*; and *Ouvrage de Pénélope ou le Machiavel en Médecine*.

LAMINARIACEÆ, Kelps or Tangles, a family of Brown Algæ, distinguished by their large size and complicated internal structure. They are mostly deep-water sea-weeds, and flourish best in the colder parts of the ocean. *Laminaria saccharina*, with simple, and *L. digitata*, with palmately divided fronds, are abundant on our coasts, and form the principal source of kelp (q.v.). *See* LESSONIA; MACROCYSTIS; NEREOCYSTIS.

LAMINATED is a term used to describe material which is apparently made up of thin plates or layers. Lamination is a defect often met with in steel and other metals where there is a separation of the material into layers. Sometimes metal parts are built up of a number of sheets or plates in layers; the finished article is said to be laminated, as in springs and armature cores.

The modern material, **laminated wood**, is increasingly used in the manufacture of furniture and in house-joinery.

LAMINATION, the arrangement of rock-material in thin layers or laminæ. This arrangement prevails especially in shales.

LAMMAS, one of the four quarterly term days in Scotland, occurring on 1st Aug. The name is from the Old-E. *hláf-mæsse*, that is, *loaf-mass*, bread-feast; so-called because on this day offerings were formerly made of the first fruits of harvest.

LAMMERGEIER (lăm'ẽr-gī-ẽr; Ger., 'lamb vulture'), the bearded vulture, a bird of prey of the genus Gypaëtus (*G. barbātus*), family Falconidæ, and linking this to the vultures and the eagles. It inhabits the Swiss and German Alps, as well as the higher mountains of Asia, and is the largest European bird of prey, measuring upwards of 4 feet from beak to tail, and 9 or 10 feet in the expanse of its wings. Besides eating carrion, it preys on living chamois, lambs, kids, hares, but it does not disdain, when pressed, rats, mice, and other small quadrupeds. In Africa it is replaced by an allied species (*G. ossifragus*).

LAMMERMUIR HILLS, a range of Scottish hills stretching in a generally eastward direction from south-east Midlothian to the North Sea, and forming part of the boundary between Berwick and Haddingtonshires. Highest summit, Lammer Law (1,733 feet).

LA MOTTE, Jeanne de Valois, Comtesse de, French adventuress, a descendant of the family of Valois by an illegitimate child of Henry II, and notorious for the part she played in the 'diamond necklace' fraud; born 1756, died 1791. She married the Comte de la Motte, a penniless adventurer, and settled in Paris about 1780. In the years 1783–4 the Prince-Cardinal de Rohan, who had fallen into disgrace, was persuaded by her that the Queen, Marie Antoinette, regarded him with much favour, which would be increased if he would assist her in purchasing a valuable diamond necklace which Louis XV had ordered for Madame du Barry, but which was still in the jeweller's hands.

The cardinal fell into the snare; he agreed to stand surety for the payment, and the necklace was delivered to him. Joseph Balsamo, Comte de Cagliostro, and probably the queen also, was in the plot; the necklace disappeared, was broken up and sold, probably by the La Mottes. The jeweller, after waiting a long time for his money, applied direct to the court, and the plot was discovered.

Cagliostro, the cardinal, and others were thrown into the Bastille, but at the trial only the La Mottes were convicted. They escaped to England, where the comtesse wrote *Mémoires* implicating the queen in the fraud. She was killed by falling out of a window in a drunken orgy, and her husband lived a miserable wandering life till his death in 1831.

LAMP, a vessel in which oil or other inflammable substance is burned to produce artificial light. The term is, by association, applied to any device in which light and heat are produced, such as arc lamp and incandescent lamp. The earliest lamps in common use were made of baked clay, with a simple opening in the top through which the wick passed. In later days much was done to improve the appearance of these lamps, and eventually lamps made of metal—generally bronze—were introduced.

Although considerable attention was devoted to the ornamentation of these early lamps, little or no consideration was given to the improvement in the efficiency of the lamps as light producers until the latter half of the eighteenth century. At this time the small cord wicks were replaced by flat wicks with raising and lowering gear.

In 1784 Aimé Argand, of Geneva, introduced an improved lamp in which a circular wick was employed, with an air supply up the central tube as well as on the outside of the wick. A glass funnel surrounding the flame and supported on a perforated base below the burner improved the combustion. This Argand burner, with small modifications, is the basis of most modern oil-lamps.

Oil-lamps in which the fuel is made to take a gaseous state by heating and the use of air pressure are used for both lighting and heating. In some of the lighting devices of this character illumination is obtained by the partial vaporization of the oil. Where the oil is completely changed in state, a flame of the Bunsen character is used to heat a mantle to incandescence.

The heating lamps are usually of the type giving complete vaporization of the oil. For lighthouse work, oil-lamps of the circular-wick type were formerly usual, but in most cases electric-lamps—or gas—are now employed. *See* ELECTRIC LIGHT; GAS MANUFACTURE.

LAMPBLACK, a fine soot formed by the condensation of the smoke of burning oil, pitch, or resinous substances in a chimney terminating in a cone of cloth. It is used in the manufacture of pigments, blacking, and printing inks. *See* CARBON.

LAMPEDU'SA, a small island of Italy, about midway between Sicily and Tunis, where there is an Italian penal settlement. It produces wine and fruits, and has a small but excellent harbour.

LAMPETER, a municipal borough and town of Wales, Cardiganshire. The town is well known as the seat of St. David's College, affiliated with Oxford and Cambridge, which trains candidates for the Episcopalian ministry. Pop. (1931), 1,742.

LAM'PREY, the name of several eel-like, scaleless vertebrates, ranking below fishes, which inhabit both fresh and salt water; genus Petromyzon, class Cyclostomata. The lampreys have seven rounded gill-apertures on each side of the neck, and a single nostril on the top of the head; they have no pectoral or ventral fins. There are no biting jaws, and the mouth is in the form of a sucker, lined with strong teeth and cutting plates, and the river lampreys are often seen clinging to stones by it. The egg hatches out into a peculiar larva known as Ammocœtes.

The marine or sea lamprey (*P.*

marinus) is sometimes found so large as to weigh 4 or 5 lb. It is of a dusky brown marbled with yellowish patches, is common round the British coasts, and is also found on the east coast of North America and the west coast of Africa. It ascends rivers in the spring for the purpose of spawning, and was formerly much valued as an article of food. Other species, some belonging to distinct genera, are native to the coasts and fresh waters of North America, Chile, Australia, New Zealand, and Japan.

The river lamprey or lampern (*P. fluviatilis*) is a smaller species, and abounds in the freshwater lakes and rivers of northern countries. It is coloured black on its upper, and of a silvery hue on its under surface. A close ally is the lesser lampern, sandpride, or sand-piper (*P. planeri*). Lampreys attach themselves to other fishes and rasp away their flesh; they also eat soft animal matter of any kind.

LAMPROPHYRE, a name first given by Gümbel in Bavaria to certain igneous rocks rich in mica, which have in consequence a brilliant lustre (Gr. *lampros*). It is now used, following Rosenbusch, for a wide range of compact rocks, mostly occurring as dykes, and specially rich in mica, amphibole, or pyroxene. The felspars range from orthoclase to lime-soda species, and the percentage of silica in the lamprophyre group may vary from 65 to 40.

LAMP-SHELLS, the familiar designation of members of the phylum Brachiopoda, especially those of the genus Terebratula, the bivalve shells of which when closed bear a close resemblance to the shape of the old Roman or classical lamp. The valves are dorsal and ventral in position, and bilaterally symmetrical. They are of unequal size, the ventral one being larger and perforated by a round hole, through which protrudes a stalk by which the animal is attached to some firm object.

LANARK, the county town of Lanarkshire, is a royal, municipal, and police burgh, situated on an elevation near the right bank of the Clyde, 31 miles south-east of Glasgow by the Caledonian Railway. It is a very ancient place, and was made a royal burgh by Alexander I. Not far from Lanark are the Falls of the Clyde, in a romantic and richly wooded part of the valley, which render the town a favourite resort for tourists. Every June a town festival is held on Lanark Moor, and there are race meetings twice a year. Pop. (1931), 6,178.

LANARKSHIRE, or **CLYDESDALE,** a south-western inland county of Scotland, lying in the valley of the River Clyde; area, 562,821 acres, of which about one-third is under cultivation. It is divided into three principal districts or wards, called respectively the Upper, the Middle, and the Lower, the last containing the greater part of Glasgow, which, however, is a county-city. The upper ward consists largely of mountain, moorland, and pastoral heights, several of the elevations reaching from 2,000 to 3,000 feet above the sea.

The middle and lower wards comprise a large aggregate of arable land, woodland, and a rich tract of orchard country which has long been famous. They are also very rich in coal, ironstone, limestone, and sandstone, which are extensively wrought, and the development of these industries has made Lanarkshire the most densely populated of all Scottish counties, containing roughly one-third of the total population of the country (i.e. pop. (1931), 1,585,968, or 31·5 per cent of total Scottish population).

Historically the county is of great interest, and associated with such battles as Drumclog and Bothwell Brig. The River Clyde traverses the county from S.S.E. to N.N.W., and practically divides it into halves. The main contributory streams are the Kelvin, Cart, Douglas, Avon, and Calder.

There are seven parliamentary divisions. The chief towns are Glasgow, Coatbridge, Airdrie, Hamilton, Rutherglen, Motherwell, Wishaw, and Lanark, the county town, which is smaller than any of the others.

Lanarkshire is one of the main breeding-grounds of the famous Clydesdale type of heavy draught horse, which combines great muscular strength and endurance with an amiability and docility that has recommended it, above the Shires and Suffolks, to foreign and colonial buyers.

LAN'CASHIRE, or the County Palatine of Lancaster, a maritime county in the N.W. of England, facing the Irish Sea, a part of it in the north, called Furness, being cut off from the rest by Morecambe Bay; area, 1,200,122 acres. Towards the sea the land is flat, but on the east and north it becomes more elevated.

The district of Furness is an integral part of the mountains of Cumberland, the highest summit being Coniston 'Old Man,' 2,633 feet. The peat-mosses or bogs of Lancashire form one of its most remarkable physical features. The most extensive of these is Chat Moss (q.v.). The most important mineral product of Lanca-

shire is coal, which occurs abundantly in the south and south-west.

Another valuable product is the hæmatite iron ore, which occurs abundantly in the Furness district, and the working of which inaugurated a new era in this part of the county. Excellent freestone is quarried near Lancaster. Limestone occurs abundantly. In the north of Furness are quarries of blue slate, and copper occurs and is worked in Coniston Fells.

Lancashire is the grand seat of the cotton manufacture, not only of England, but also of the world, Manchester being the principal centre. Woollen goods are also largely produced, as is also machinery of all descriptions, and a vast variety of other articles. Liverpool is the great shipping port of the county and of England.

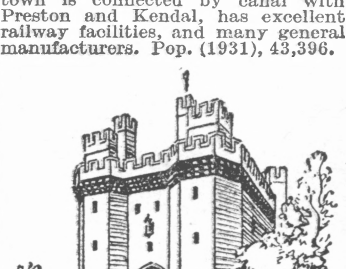
Lancaster is the county town, but there are a great many others far larger, such as Liverpool, Manchester and Salford, Oldham, Bolton, Blackburn, and Preston. Blackpool and Southport, two of the best-known seaside-resorts in England, are situated upon the Lancashire sea-board. As one of the Counties Palatine, Lancashire is nominally attached to the Duchy of Lancaster, and the king, being Duke of Lancaster, has the right of appointing its sheriff. Pop. (1931), 5,039,455.

LANCASTER, Joseph, the propagator of the educational system (Lancasterian system of instruction) with whose name is coupled that of Dr. Andrew Bell, was born in London in 1778, died at New York through a carriage accident, 1838. In 1798 he opened a school for children in Southwark, which he conducted on the monitorial system, which had been previously outlined by Dr. Bell, 1797. (*See* BELL, ANDREW.)

The principal features of the system were the teaching of the younger pupils by the more advanced students, called monitors, and an elaborate system of mechanical drill, by means of which these young teachers taught large numbers at the same time. He soon found powerful support, and was able to erect a schoolhouse, which in 1805 was attended by 1,000 children.

The number of his patrons and the amount of subscriptions continuing to increase, he founded a normal school for training teachers in his system, which he now hoped to be able to extend over the whole kingdom. He made extensive tours through Great Britain and Ireland, and in 1811 had founded 95 schools, attended by 30,000 children. He was reckless and improvident in his habits; became bankrupt, and emigrated to America in 1818, where he at first received some support, but ultimately fell into poverty.—Cf. A. B. Binns, *A Century of Education*, 1808–1908, *being the Centenary of the British and Foreign School Society*.

LAN'CASTER, a municipal borough and river-port, England, the county town of Lancashire, on the left bank of the Lune. It occupies the acclivities of a hill, on the summit of which stands the castle, now used as the county jail, built in the reign of Edward III, but with a keep supposed to be Saxon, and with a tower on the south-east attributed on the Emperor Hadrian. The town is connected by canal with Preston and Kendal, has excellent railway facilities, and many general manufacturers. Pop. (1931), 43,396.



Lancaster Castle

LANCASTER, a city of the United States, capital of Fairfield county, Ohio, on the Hocking River, about 32 miles S.E. of Columbus. It is situated in a natural-gas district, and petroleum was tapped quite near the city in 1908, while there are iron-foundries, flour-mills, and manufactures of machines and agricultural implements. Pop. 14,706.

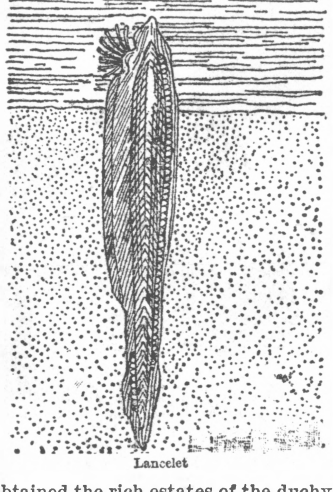
LANCASTER, a city of the United States, in Pennsylvania, seat of Lancaster county, and formerly the state capital. It has very extensive manufacturing interests, and is one of the principal tobacco-leaf markets. It is also the centre of a rich wheat district, and carries on an extensive lumber trade. Pop. (1930), 59,949.

LANCASTER, DUCHY OF, name of the estates that belong to the King as Duke of Lancaster. They are chiefly in the counties of Staffordshire and Lancashire and are managed by a council, the head of which is the chancellor of the duchy, a member of the Government. In 1929 the income of the duchy was £127,000, and £62,000 was paid to the King. The

duchy has an attorney-general, and courts are held in the name of the Duke, who appoints the high sheriff of the county.

LANCASTER, DUKE OF, title borne by the king of Great Britain. Henry III's younger son, Edmund, was made Earl of Lancaster in 1267, and this title passed to his great-grandson, Henry, who was made a duke in 1351.

Duke Henry was a famous soldier until his death on 13th May, 1356. He left no sons, only a daughter who married, in 1359, John of Gaunt, a son of Edward III. In this way Gaunt



Lancelet

obtained the rich estates of the duchy and the title of Duke of Lancaster, which passed on his death to his son, who became Henry IV. The duchy then became associated with the crown and since that time (1399) the king, or queen, has been Duke or Duchess of Lancaster.

LANCASTER, DUKE OF, English prince. John of Gaunt, so named because he was born at Ghent, was the fourth son of Edward III. Born 24th June, 1340, in 1359 he married Blanche, the heiress of Henry, Duke of Lancaster, and so obtained that title. She died in 1369 and he married Constance, daughter of Peter, King of Castile. John spent much of his time fighting in France and Spain, and at one time hoped to become King of Castile. When his father's health was feeble he became active in English politics, and he remained so during the reign of his nephew, Richard II. At this ti he was the leader of the party th favoured the teaching of Wycliffe a opposed the church. He died 3rd Fe 1399, leaving a son who became Hen IV., and a daughter, Catherine. H third wife was Catherine Swynfor By her he was the father of the Bea forts, who played an important pa in public affairs during the reigns Henry IV. and Henry V.

LANCASTER SOUND, a passa leading from the north-west of Baff Bay west to Barrow Strait. It w discovered by Baffin in 1616, is abo 250 miles long, and has a centr breadth of about 65 miles.

LANCELET, the popular name primitive marine vertebrates, 2 or inches long, with a slender, compresse transparent, lance-shaped body, o curring in shoal water in the tem perate and torrid parts of the eart where they burrow actively in th sand.

They were formerly referred to as single genus and species (*Amphioxu lanceolatus*), but a number of specie are now recognized and placed in tw genera (Branchiostoma and Asym metron). These constitute the sub phylum Cephalochorda of the verte brate phylum.

At one time they were regarded a a lowly group of fishes (Pharyngobran chii or Leptocardii). No true or paire fins are present, and in the other part of their anatomy the low organizatio of these creatures is readily appreci able. The vertebral axis consists of a slender rod (*notochord*) pointed at each end, and composed of elastic tissue. There is no skull. The mouth is of oval shape, situated below and slightly behind the front part of the body, and there are no true jaws. Its margin is stiff, and bears a number of delicate ciliated filaments or *cirri*. The mouth leads backwards into a very large dilated chamber representing the expanded pharynx, which performs the part of a breathing organ; and the walls or sides of the pharynx are perforated by transverse clefts or fissures, whilst the inner lining of the chamber is ciliated.

Breathing takes place by the admission of water through the mouth into the dilated pharynx, the effete water passing through the slits or clefts in the sides of the sac into an atrial cavity, whence it escapes outwardly by an opening known as the 'abdominal pore.'

The circulation of the blood, which is destitute of colour, is performed by pulsation of the main blood-vessels, there being no distinct heart. The pharynx is continued into a stomach and straight intestine. The lateral

uscle is divided into a series of segents, and the central nervous stem consists of a tube lying above e notochord. A patch of pigment abedded in the front of this tube presents a simple eye. The sexgans are in the form of a series of ickenings in the body-wall, which scharge their products into the surunding sea-water, where fertilizaon takes place. The egg hatches out to a larva, which passes through a mplicated metamorphosis to reach ie adult stage.

LANCELOT OF THE LAKE, the ame of one of the paladins celebrated i the traditions and fables relating to ing Arthur and the Round Table. ccording to tradition, Lancelot was he son of Ban, King of Benoic, was ducated by the fairy Viviana (the ady of the Lake), and became one of he chief knights of Arthur's court. His love for Genevra, or Guinevere, he beautiful wife of Arthur, and his disregard of Morgana, a fairy, and the ister of Arthur, placed the knight in he most dangerous and marvellous ituations, from which, however, he lways extricated himself by his alour and the assistance of the Lady f the Lake.

Le Roman de Lancelot du Lac, a famous mediæval romance, was compiled by Walter Mapes (1150–96). The oldest extant form of the Lancelot story is contained in the German poem *Lanzelet* by Ulrich von Zatzikhoven (twelfth century). The tale, however, is probably Celtic in its essentials. Christien de Troyes, the French trouvère, made use of the Lancelot story for a love romance. The story passed from the French into the *Morte Darthur* of Sir Thomas Malory printed in 1485. Lancelot is one of the chief figures in Tennyson's *Idylls.*—Cf. J. L. Weston, *The Legend of Sir Launcelot du Lac.*

LANCERS, light cavalry taking their name from their principal weapon, a 9-foot lance. There are in the British service six regiments of lancers, and the name is also well represented among the cavalry regiments of the Indian army.

As a weapon for cavalry the lance has not been continuously used in the British or any other European army. In the Middle Ages it was the principal arm of the knights, each of whom, whatever other weapons he might carry, had a lance carried for him by his squire. Then, with the gradual introduction of fire-arms, it became the fashion to place too much reliance on the very elementary forms of musket and pistol available, till, in the early seventeenth century, the lance had completely disappeared, and the cavalry of that day, though still armoured to some extent, were armed merely with a sword and some form of fire-arm, and trusted entirely to fire action to the entire exclusion of their proper sphere of shock action. They had become, in fact, merely dragoons (in the original meaning of the word), and made no use of the *arme blanche.*

In the Thirty Years' War Gustavus Adolphus of Sweden, seeing that he was losing more than half the value of his cavalry, changed the universal system and trained his horsemen to make use of shock action, leaving fire action to the infantry and dragoons (mounted infantry). The system thus evolved in time became general, and was followed and improved upon by other captains of that and the following age.

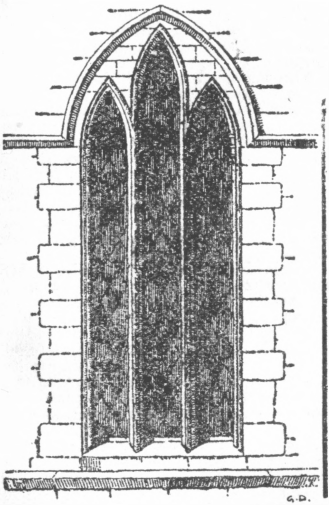
Shock action at speed was now universally recognized as the proper rôle of cavalry, but the sword was the only weapon with which it could be carried out. Pistols, and in later years a carbine, did, it is true, form part of the equipment of a trooper, but the carbine at any rate was of no use when mounted. The word dragoon had by now lost its original meaning, and dragoons were used as heavy cavalry proper.

In the second half of the eighteenth century certain regiments of horse were raised in the British service, and called light dragoons; these were armed, according to the prevailing fashion, with sword and carbine. Then, during the wars of the opening years of the nineteenth century, appeared in the French army certain regiments of Polish lancers, which proved to be of considerable value as 'cavalry screens,' though in a more sustained action this value was less evident. They were at least true light cavalry, and were armed with an ideal weapon for mounted fighting.

The British authorities therefore decided to follow Napoleon's lead, and in consequence ordered, in 1816, certain light dragoon regiments to be reformed as lancers and to exchange the carbine for the lance. A distinctive uniform was also evolved, based to some extent on the original Polish pattern. In its main features this uniform survives to the present day, the most distinctive item being the lancer cap, a tight-fitting helmet with a square flat top, adorned with a plume.

Lancer regiments in the British service were as follows, date of raising being given in brackets. 5th (Royal Irish) Lancers (1798): uniform blue; facings, scarlet; plume, green. 9th (Queen's Royal) Lancers (1715): uniform, blue; facings, scarlet; plume, black and white. 12th (Prince of

Wales's Royal) Lancers (1714): uniform, blue; facings and plume, scarlet. 16th (The Queen's) Lancers (1759): uniform, scarlet; facings, blue; plume, black. 17th (Duke of Cambridge's Own) Lancers (1759): uniform, blue; facings and plume, white. 21st (Empress of India's) Lancers: uniform, blue; facings, French grey; plume, white. In 1922 some regiments were amalgamated, and the following is the present list of Lancer regiments —9th, 12th, 16th/5th, 17th/21st, Lancers. Six years later the 12th Lancers was converted into a Cavalry Armoured Car Regiment.



Lancet window, Warinington, Northamptonshire, 1240 A.D.

LANCET WINDOW, a high and narrow window with an acutely arched top. Lancet windows are a marked characteristic of the early English style of Gothic architecture, and are in a great degree peculiar to England and Scotland. They are often double or triple, and sometimes five are placed together, as in the window called the 'Five Sisters' at York.

LANCEWOOD, the popular name of the wood of several trees of the ord. Anonaceæ, as of the *Oxandra virgāta,* a native of Jamaica, *Duguetia quitarensis,* a native of Cuba and Guiana, which possesses in a high degree the qualities of toughness and elasticity, and is on this account extremely well adapted for the shafts of light carriages, and all those us where light, strong, but elastic timb is required.

LANCHESTER, town of Durhar It is 8 miles from Durham, on tl L.N.E. Rly. The chief occupation coal mining. The town occupies tl site of a Roman city, and many Roma remains have been unearthed. Po 5,200.

LANCIANO (lán-chā'nō), a city Southern Italy, in the province Chieti (Abruzzi-Citeriore), the ancier *Anxanum.* It is the see of an arcl bishop, and has an ancient cathedr and the remains of a Roman theatr Pop. 20,000.

LANCING, village of Sussex. It i 9 miles from Brighton, and has of lat become a seaside resort. On th Downs above the village is Lancin College, properly S. Nicholas College Lancing, a public school with accom modation for about 400 boys. Pop 4,000.

LAND, word used for the earth o which we live and which provides u with the fundamental needs of humar life. In most countries of the world a great deal of it is owned by privat individuals, but there are publi lands, or land which belongs to th state as a whole. Much of the land i private hands is let out for rent.

The private ownership of land ha created many difficulties, and some times perhaps injustices, and as a remedy its nationalization has been suggested. The special taxation o land, which it is argued differs from other commodities in that its amount is strictly limited, has been advocated, and in one or two cases has been put into practice. In Ireland, where the land problem is particularly acute, much of the land has been bought by the tenants from the landlords with the aid of the state.

In Great Britain economic causes in the 20th century have led to the sale and break up of many large landed estates. All over the civilized world the tendency is for the ownership of land to pass from the large holder to the small one.

In Great Britain land is conveyed from one person to another by lawyers who draw up conveyances, which, with other documents, constitute the title deeds. This applies to the two kinds of land found in the country, freehold and leasehold. The laws dealing with land are very cumbersome, but a series of laws passed in 1925 helped to simplify them.

To facilitate the transfer of land, a system of registration has been devised. This has been adopted in Canada, Australia and other parts of the British Empire and to some extent in

gland. An office for the registration of titles to land was opened in ndon. In 1898 the registration of id sold was made compulsory in e county of London, and in 1925 in e borough of Eastbourne; it is also mpulsory in Yorkshire and Middlex; elsewhere it is optional. The vner of land on the register for a rtain time obtains an absolute title it which is guaranteed by the State, id future transfers can be carried out small cost.

LAND, In economics, one of the ctors in production, the others being pital and labour. The share of the int product which it receives is nown as rent. According to Ricardo's eory of rent, the amount of rent is ecided by the value of a piece of land ver land on the margin of cultivaion, i.e. land which just pays for the xpenses of cultivation and no more.

This idea of rent is quite sound in heory, but in practice is needs modification. Local customs play their part in determining the value of land. Moreover, land, especially agricultural land, has had a certain amount of capital put into it, and must offer a return in the shape of profits.

The enormous increase in land values in towns has led to a demand for special taxation on these, but so far only temporary expedients have been attempted in this direction.

LANDAU (lan'dou), a town of Germany in Bavaria, on the Queich, formerly strongly fortified. It passed from French to Bavarian hands in 1815. The carriages known as landaus derive their name from Landau, where they were first built in the eighteenth century. Pop. 14,486.

LAND-CRABS, crabs so called from their semi-terrestrial mode of life, their habits leading them to live on land, and away from the sea, even for considerable periods of time. The true land-crabs (Gecarcinidæ) occur in Asia, particularly in the Eastern Archipelago; in America, and specially in the West Indian Islands; and in Australia also. The best-known species is *Gecarcinus ruricola*, found in the higher parts of Jamaica, which often proves very destructive to the sugar-plantations.

The crabs of the genus Cardisoma, represented by the common species *C. carnifex*, and inhabiting the West Indian mangrove swamps and marshes appear to feed upon both vegetable and animal diet. Among other species of land-crabs may be enumerated the sand-crabs (Ocypodidæ), with the beckoning or calling crabs (Gelasimus), and the Thelphusidæ, which inhabit freshwater streams, but appear to be equally at home when on land.

LANDES (lând), a term specifically applied in France to extensive level and largely barren tracts stretching from the mouth of the Garonne along the Bay of Biscay and from 60 to 90 miles inland, bordered with sand-hills next the sea. They bear chiefly heath and broom, but the seaward side has been largely planted with maritime pine, chiefly to protect neighbouring districts from sudden movements of the sand-dunes and their migration farther inland.

A considerable area has been reclaimed by means of a drainage scheme, and the stilts upon which the Landesats used to traverse the more marshy regions are now nearly obsolete. These stilts were once utilized in Scotland to facilitate the crossing of rivers, and are mentioned in Sir Walter Scott's *Quentin Durward*: cf. "I would have known thee, boy, in the landes of Bordeaux . . . like a crane on a pair of stilts."

LANDES, a maritime department of France. It has an area of 3,604 sq. miles, and contains three arrondissements, Mont-de-Marsan (the capital), Dax, and St. Sever. The fertile lands consist chiefly of the alluvial valleys to the south of the Midouze and the Adour. The vine is cultivated to a considerable extent in the fertile districts, as are also maize and rye; the Landes horses are prominent. Pop. (1931), 257,186.

LANDGRAVE (Ger. *land*, country; and *graf*, count), a German title surviving from the time of the Holy Roman Empire, and formerly bestowed upon district governors or upon rulers of small principalities, to distinguish them from counts, inferior in order of precedence and nobility. Landgraviates formerly existed in Thuringia and Lower and Higher Alsace.

LAND LAWS. In primitive society might is right. The stronger tribe ousts the weaker from the hunting-grounds or pasture lands it covets. Each tribe occupies only what it can hold by force. But as, owing to growth of numbers and other causes, a nomadic life becomes less desirable and the spoils of the chase, though supplemented by the tribal herds, become too precarious as a means of existence, man's attention is turned to agriculture, and with agriculture comes a more settled existence. For a time the tribal herds remain its chief wealth, and only a comparatively small portion of the land around the settlement is cultivated. Usually the cultivation is in the hands of the heads of families, amongst whom it is annually parcelled out.

Pressure of numbers, however,

again exerts its influence. More land requires to be cultivated, and cultivated more intensively, and the man who succeeds in getting a good return from his plot naturally objects to a redistribution which may not improbably be to his disadvantage. The more labour he expends upon his plot, the more he comes to regard it as his own by right. If he has the power, he declines to part with it, and as such an attitude becomes generally adopted, it readily gains recognition as a right. The idea of private property becomes established, and the necessity for laws regulating more fully its enjoyment and its transference arises.

In Saxon England the unit was the village. Large pasture lands were held by the villagers in common, and at least the head of each family cultivated a plot, sometimes in conditions of permanence, sometimes under a system of periodical rearrangement. But at the Norman Conquest the sweeping changes wrought on the Continent by the growth of feudalism were introduced into England. The theory of the feudal system (q.v.) is that all land is held of the sovereign, in whom resides the ultimate ownership.

Lands were seized by the conqueror, and allotted to his great retainers in return for military services. In course of time these vassals obtained the right to make subordinate grants to others, who thus held immediately of them and mediately of the Crown. Gradually the feudal services fell into disuse, and money payments generally took their place.

By the Statute Quia Emptores subinfeudation was abolished, but vassals were permitted to sell their holdings, the purchasers stepping into the shoes of the vassals and holding of their superiors. In the reign of Henry VIII power was given to devise land by will, while entails were authorized by the Statute De Donis.

In Scotland feudalism took firm hold. Generally the chiefs of the clans became the feudal vassals of the Crown. Subinfeudation was, and is, common, and since 1874 cannot be prohibited. It may go on to any extent. But in early times a vassal could not substitute a person in his place without the lord's consent, i.e. although (unless prohibited) he could grant a subordinate feu of the entire holding to be held of himself, he could not transfer it out-and-out to be held of his superior. This disability has for long been abolished. Its advantage in the days when military service was a necessity, and the superior was concerned in having a vassal who could render it, is obvious. The Clan Act of 1715 finally abolished military services.

The interest of the superior known as the *dominium directum*, superiority, because feudally it is superior right, while that of the va is termed the *dominium utile*, property, because he has the m profitable interest, the *de fa* ownership.

Generally speaking, apart from c tract, the owner of land has the ri to do what he pleases with it. Thus may build on it, cultivate it, excav it, sell it, let it, burden it, give away, or bequeath it. His use of however, must, as a general rule, r be such as to interfere with the rigl of others, nor such as to create nuisance. Accordingly he must n dig upon his lands to such an exte as to bring down the lateral suppo of the adjacent lands. He has e clusive possession, and may therefo prevent unauthorized persons fro going on to his lands, i.e. trespassin but a trespasser is liable only in civ damages unless his trespass has bee in pursuit of game.

The ownership of land is said to l 'a coelo usque ad centrum.' Th minerals, therefore, belong to th owner of the surface, and he ma prevent tunnelling. The mineral however, may be held as an estat separate from the surface, in whic case the owner of the minerals has n right, apart from contract, to brin down the surface; but if in carryin on operations in the usual way h drains off underground water fron the neighbouring lands, no action o damages will lie against him therefor Possibly, too, no one is entitled to fl over land without the owner's con sent. The Aerial Navigation Act pro hibits flying over certain defined areas

Standing water, such as a lake, be longs to the owner of the land. He has also the right to use a stream flowing through his land, but, as a general rule, he must neither interfere with its natural flow nor pollute it. The soil of rivers which are both navigable and tidal belongs to the Crown; that of other streams to the owner of the land. If a stream runs between adjacent estates, the boundary is the 'medium filum.'

Land must be enjoyed subject to any easement (q.v.) affecting it. Unlike an easement, a title to land in England cannot be acquired by prescription. In Scotland, however, prescription operates, and a good title to land can be acquired by possession for twenty years on an *ex facie* valid irredeemable title. Thus A, of full age, having a defective title, or even no title, to a certain piece of land, conveys it absolutely to B, and B records the conveyance and possesses on it for twenty years; B has

valid title which even the true ner cannot reduce.

In England registration of title is rgely optional; but provision is ade in the Lands Registry Act, 1925, hich may enable the area of regis- ation to be widely extended in ten ars from 1st Jan., 1926; in Scotland o real right is complete without it. recent years a strong movement as been set afoot in England for the axation of land values.

See also the articles on COMPEN- ATION; FEE; HEIR-IN-LAW; IN- LOSURE ACTS; MORTMAIN; &C.— IBLIOGRAPHY: Sir H. S. Maine, *illage Communities*; F. Seebohm, *The English Village Community*; oyd Kinnear, *Principles of Property n Land*; Sir F. Pollock, *The Land aws*; J. Williams, *Law of Real Property*; J. A. Strachan, *The Law of Property*.

LAND LEAGUE, an organization projected by Parnell, the leader of the Irish national movement, in 1879, the ostensible object of which was to purchase the land of Ireland for the people of Ireland. Funds were largely subscribed, especially in America, but the stringent rules against landlords and tenants holding aloof from it, and the complicity of its members with many terrible outrages, caused it to be declared an illegal association in Oct., 1881, and to be suppressed.

After the suppression of the Land League a political and agrarian organization called the *National Leagu* was formed. Its main objects were understood to be the reform of the land laws, the weakening of the power of the landlords, the increase of peasant proprietors, and the establishment of some kind of independent or semi-independent government for Ireland.

LANDLORD AND TENANT. The relationship of landlord and tenant is constituted when one who is owner of, or who has a legal interest in, lands, houses, or other subjects (the landlord or lessor) lets out the same to another person (the tenant or lessee) in consideration of a capital sum or of an annual return (rent) or of both primum and rent. In England a lease for a period not exceeding three years is valid if made by deed, by informal writing, or by verbal contract followed by possession. Beyond three years a lease is good only if constituted by deed.

The term of the lease may be for a period of years from year to year, or at will. A tenant for life can grant a building lease for 999 years, mining 100, forestry 999, other leases 50 years. A tenant in tail by the Settled Land Act of 1925 has the powers of a tenant for life. A lease or agreement for lease reduced to writing must bear an *ad valorem* stamp, the value being determined by the consideration of the term of endurance.

If there is no express agreement to repair, the law implies a covenant on the part of the lessee to use the premises in 'a tenant-like manner,' which entails an obligation to do a certain amount of repairs which has never been precisely defined, but a tenant at will is under no obligation to repair, and a tenant from year to year need only keep the premises wind and water tight. If the tenant expressly undertakes to leave the premises in the condition in which he got them, he is liable for ordinary wear and tear unless expressly excepted. He must use the premises in a proper manner and make good any damage which he or his household may negligently cause, e.g. by vacating the premises during the currency of a let and leaving them unoccupied; and if he covenants to do the repairs and the premises are destroyed, he must replace them unless expressly excepted.

In letting furnished or working-class houses the landlord is held to undertake that they are fit for human occupancy, and if they are not so, the tenant may rescind the contract and be free of the rent. Apart from special agreement a lease is not rescinded by destruction of the premises, e.g. by fire, but the landlord is not obliged to rebuild. It is therefore advisable to stipulate in the lease that in the event of the complete or partial destruction of the property the landlord shall rebuild or restore them within a stated time, and that should he fail to do so the liability of the tenant shall cease.

In agricultural leases there is an implied obligation on the tenant to maintain the hedges and fences and to cultivate the land in accordance with the custom of the country. At his outgoing he is entitled to compensation for improvements on the holding effected by him during his tenancy.

Unless expressly prohibited, the tenant may underlet or assign the premises, but in the latter case he remains liable for the rent should the landlord decline to accept the assignee in substitution. Since the coming into force of the Landlord and Tenant Act, 1927, if a tenant has covenanted not to assign or underlet without the consent of his landlord, such consent cannot be unreasonably withheld.

If the lease is for a fixed period, it comes to an end by mere effluxion of time, and notice is not required to terminate it. In lettings from week to week, month to month, or quarter to quarter, the notice required is respectively a week, a month, and a

quarter; in lettings from year to year, six months; in agricultural leases, one year. A tenancy at will is terminable at the pleasure of either party after reasonable notice.

At the expiry of the lease the tenant must deliver up full possession of the demised premises (even if he has sublet them), together with all the buildings, erections, and fixtures, other than fixtures introduced for the purposes of trade, agriculture, convenience, or ornament, which may, as a rule, be removed by the tenant before the termination of the let if such removal will not result in material damage to the freehold. (*See* FIXTURES.)

Trade fixtures comprise all articles of a chattel nature used for trade although they may be affixed to the freehold, and include furnaces, vats, fire-engines at a colliery, salt-pans, baking-ovens, hydraulic presses fixed in brick and mortar, fixed steam-engines and boilers, the greenhouses and hothouses of a market gardener, and nursery trees and shrubs if planted by the tenant in the way of his trade.

Agricultural fixtures are more widely construed, and include engines, machinery, fencing, and even buildings for which no compensation is payable at the tenant's outgoing, and which have not been affixed in virtue of an obligation in that behalf.

One month's written notice of intention to remove them must be given to the landlord, who may elect to purchase them at their fair value to an incoming tenant. Fixtures for convenience or ornament include hangings, tapestries, mirrors, chimney-pieces, window-blinds, grates, bookcases secured to the walls, and brackets.

By the Landlord and Tenant Act, 1927, which came into force on the 25th March, 1928, a tenant may obtain compensation for improvements which he has made in the property after the coming into operation of the Act, and at least three years before the termination of his tenancy unless the landlord offers him a renewal of the lease on reasonable terms. A tenant may also obtain compensation for loss of goodwill or even a renewal of the lease if the sum which could be so awarded would not be adequate compensation.

Generally speaking, chattels and personal effects found on the premises may be distrained for rent; but the goods of a lodger, things in actual use, articles left on the premises in the way of trade, e.g. a watch to be repaired or cloth to be made up into a costume, perishable goods, loose money, goods in a warehouse for safe custody, pledges in a pawnbroker's shop, wearing apparel and bedding, and tools to the value of £5 unless the tenant is holding over (q.v.), live stock and implements if other property is available and agricultural machinery are privileged.

The Rent and Mortgage Interest Restrictions Acts, 1920–5, imposed certain restrictions on the right of a landlord to increase the rent of, or to eject the tenant from, any house the rent or rateable value of which at 3rd Aug., 1914 (immediately prior to the outbreak of the European War), did not exceed—in the metropolitan police district, including the City of London—£105; in Scotland, £90; elsewhere, £78.

The practical effect of the Act was to give security of tenure at a limited increase of rent so long as there was no suitable accommodation elsewhere, and provided the tenant paid the rent and observed the conditions of his tenancy and was not guilty of nuisance, annoyance, &c. The county court judge within whose jurisdiction questions arising out of the Acts lay was in all cases given wide powers of discretion in deciding whether in any particular case an order for possession should be made. The operation of the Acts has been extended from time to time, and was again extended in 1932, though the scope of the Acts was then very much restricted and their operation was practically confined to lower rented houses.

In Scotland a verbal contract of lease is valid only for one year. Unless otherwise agreed, the landlord must keep urban subjects (houses, shops, manufactories, and the like) in proper repair, and their accidental destruction terminates the contract. Urban leases may be assigned or the subjects sublet, unless expressly prohibited. The landlord has a lien (hypothec) over the goods brought on to the premises (the *invecta et illata*), including furniture on hire, goods for sale or sold but not delivered, and the property of a subtenant to the extent of the sub-rent outstanding, but not including property of a lodger or member of the tenant's family, or articles deposited or lent, or, in small dwelling-houses, the bedding and tools of trade, and such furniture to the value of £10 as the tenant may select. The tenant must keep the subjects plenished. There is now no hypothec over agricultural and pastoral subjects exceeding 2 acres in extent.—BIBLIOGRAPHY: E. Foa, *The Relationship of Landlord and Tenant*; Fawcett, *Landlord and Tenant*; Tiffany, *The Law of Landlord and Tenant*; B. W. Adkin, *A Handbook of the Law relating to Landlord and Tenant.*

LANDOLPHIA, a genus of climbing shrubby plants, ord. Apocynaceæ, belonging to tropical Africa, Madagascar, &c., and comprising species that are important as sources of rubber.

LANDOR, Walter Savage, an English poet and prose writer, born at Ipsley Court, Warwickshire, 30th Jan., 1775, died at Florence 17th Sept., 1864. He was educated at Rugby and Oxford, from both of which he was expelled for unruliness. He published a small volume of poems in 1795, and a lengthy poem, *Gebir*, in 1798. This latter he subsequently translated into Latin verse, being one of the most accomplished Latinists of his time.

He succeeded to a large property on the death of his father, and resided for a time at Bath, and became an intimate friend of Southey. In 1808 he raised a body of men at his own expense for the defence of Spain against France. In 1811 he hastily married a Miss Julia Thuillier of Bath, and settled at Florence, where many of his works were written. Having separated from his wife, he returned to England in 1835. In 1857 the publication of some ugly slanders against a lady of Bath led to a prosecution for libel, and Landor was brought in for £1,000 damages. He left England, and once more found a resting-place in Florence, where he was aided by Browning and visited by Swinburne.

A poet of distinction, Landor has always charmed the poets themselves, although his poetry was never widely read. His fame chiefly rests on his *Imaginary Conversations*, between celebrated persons of ancient and modern times, a model of a pure, vigorous, finished English style. Among his other works are: *Count Julian*, a tragedy; *Hellenics or Greek Poems*; *Pericles and Aspasia*, imaginary letters; *Pentameron and Pentalogue*; and the dramas *Andrea of Hungary* and *Giovanna of Naples*.—BIBLIOGRAPHY: Sir Sidney Colvin, *Landor* (English Men of Letters Series); W. A. Bradley, *Early Poems of Walter Savage Landor*.

LANDRECIES (lân-dr-sē), or **LANDRECY,** a small French town, on the Sambre, department of Nord. It was formerly fortified, and played an important part in the French wars of the seventeenth and eighteenth centuries. During the European War it was the scene of fierce fighting between the French and the Germans. Captured by the Germans after the British retreat from Mons, the town remained in the enemy's possession till the end of the war. Pop. 3,700.

LANDSBERG, a town of Prussia, province of Brandenburg, and 37 miles north-east of Frankfurt, on the Warthe. It has manufactures of engines and boilers, carriages, woollens, tobacco, and spirits. Pop. 43,303.

LANDSCAPE GARDENING, a term now generally applied to the natural style of garden design, as distinguished from the formal or artificial. It originated in England in the eighteenth century, as the outcome of a distaste for the French and Dutch styles, which had been imported into this country, and, being based on a love of regularity, symmetry, and laboured art, had become obnoxious to a few men of genius, who preferred to follow nature in the planning and planting of gardens and parks.

LANDSEER, Sir Edwin Henry, painter, born in London 7th March, 1802, died there 1st Oct., 1873. As a child he began to draw animals; at thirteen he exhibited at the Academy, and the year following became a student. From that time onwards he exhibited regularly at the Academy and at the British Institution. In 1826 he was elected A.R.A.; in 1830, R.A.; in 1850 he was knighted; and in 1865 he declined the presidency of the Royal Academy.

He takes high rank among animal painters; and though he has been blamed for introducing too human a sentiment and expression into some of his animals, the humour and pathos of animal nature are well expressed in his work. But he is often weak in design, colour, and anatomical construction. A great many of his paintings are in the National Gallery. Among his best-known works are: *The Cat's Paw* (1824); *The Return from Deerstalking* (1827); *High Life and Low Life* (1831); *There's Life in the Old Dog Yet* (1838); *A Dialogue at Waterloo* (1850); *Monarch of the Glen* (1851); *Uncle Tom and his Wife for Sale* (1857); *Swannery invaded by Sea-eagles* (1869); and the celebrated *Lions* at the base of Nelson's Monument, Trafalgar Square.—Cf. J. A. Manson, *Makers of British Art*.

LAND'S END, a granite headland in Cornwall, some 60 feet high, forming the south-western extremity of England (lat. 50° 6′ N., long. 5° 45′ W.). There is a lighthouse on the Longships, a group of dangerous rocks about a mile to the west.

LANDSHUT (lânts'hŏt), a picturesque old town of Bavaria, on the Isar, 38 miles N.E. of Munich. It has many interesting buildings, among which are St. Martin's Church, a fine Gothic structure built between 1407 and 1477, with a steeple 462 feet high; the royal palace, formerly the residence of the Bavarian dukes, the

reconstructed fifteenth-century town house, and the ruined chapel of the old castle of Trausnitz. Landshut has manufactures of leather, starch, machinery, carriages, tobacco, paper, &c. It formerly had a university, transferred in 1800 from Ingolstadt, but removed to Munich in 1826. Pop. 26,105.

LANDSKNECHT, a German term for the mercenary foot soldiers, armed with pikes (lances) and swords, first organized by the Emperor Maximilian I in 1487. The term was employed to distinguish these 'fellows of the plain' from the Swiss mountaineers, also employed as mercenary soldiers.

Sir Walter Scott, in *Quentin Durward* (chap. xvii), describes a 'Lanzknecht': "His whole equipment was that of one of the German adventurers, who were known by the name of *Lanzknechts*, in English 'spearmen,' who constituted a formidable part of the infantry of that period. These mercenaries were a fierce and rapacious soldiery . . . and a *lanzknecht* was once refused admittance into Heaven on account of his vices, and into Hell on account of his tumultuous, mutinous, and insubordinate disposition . . . they manfully acted as if they neither sought the one nor eschewed the other." The French is *lansquenet* (q.v.), from which a card game derives its name.

LANDSKRONA, a seaport of Sweden, län Malmö, on a tongue of land projecting into the Sound, 18 miles N.N.E. of Copenhagen. Its harbour is the best on the Swedish coast of the Sound. Pop. (1932), 18,656.

LANDSLIP, the slipping or sliding of a considerable tract of land or earth from a higher to a lower level. Landslips are due to a variety of causes, such as earthquakes, the penetration of permeable rocks by water forming a surface of sliding on some underlying impermeable layer, or on coasts the undermining action of the sea. Among the more disastrous occurrences of this kind are the slip of the Rossberg behind the Rigi in Switzerland in 1806, burying villages and hamlets with 457 of their inhabitants; and that at Naini Tal, a sanitary hill-station in the Himálaya in 1880, when 230 lives were lost.

LANDSTURM, the German equivalent for *levée en masse*, a local militia of Germany until 1918, which was only called up for home defence and in case of actual invasion. It comprised that portion of the reserve which was too old for the *Landwehr* (q.v.), and consisted of soldiers who had completed their term of service with the first line, reserve, and Landwehr, and of untrained troops between the ag thirty-nine and forty-five. Duri the European War the Landsturm w required to undertake foreign servi

LAND VALUES, TAXATION OF, direct tax levied, for national local purposes, or the market val of land, apart from any buildings improvements upon the land. proportion to the amount of the t this taxation of land values is means of securing for the communi the economic rent of land otherwi appropriated by the land owner. the sphere of local taxation the pr posal is known as the *rating* of lan values, and it was in that form th land values taxation entered int British politics, led by many munic palities who secured from parliamer the necessary legislation to transfe rates from houses and other building to land alone, and at the same tim take contribution—always measure against the value of land—fror properties and vacant land which a long as they stand idle pay nothin whatever.

Out of this municipal agitation, an the difficulty that the House o Lords could hold up legislation t alter the local taxation system, cam the 1909 Budget which enacted valuation of all the land of th country.

Duties were imposed by the Financ Act, 1909–10, as follows: (1) **Increment Value Duty** payable on the transfer o sale of land or any interest in land, o any lease for more than fourteen years, or on the passing of land o interest in land by death; the amount of the duty being £1 for every £5 of 'increment value,' i.e. the increase in the value of the *site* over the original site value at 30th April, 1909, or since the last payment of duty; (2) **Reversion Duty** payable by a lessor on the determination of a lease of land for a term exceeding twenty-one years, duty being payable at the rate of £1 for every £10 of the value of the benefit accruing thereby; (3) **Undeveloped Land Duty** of ½*d.* per £1 per annum on the site value of any land not developed by the erection of houses or buildings for the purposes of a trade or business other than agriculture; and (4) **Mineral Rights Duty** of one shilling annually per £1 of the rental value of minerals on lease or worked by the proprietor. In each case there were exemptions, the principal ones in the first three cases being agricultural lands, and in the last case clay, sand, chalk, limestone, and gravel.

These provisions did not, however, give full effect to the real principles underlying land values taxation. The duties were repealed in 1920 and the

ıey collected from landowners was ırned to them. In the 1931 lget of the Labour Government ther and more complete proposal ı made, though it had the defect, the advocates of land taxation ard it, of exemption from taxation public value of land used for icultural purposes. There was to in the 1931 Budget, a straight tax one penny in the £ of the capital ue of land (subject to the excep- n indicated); but the tax, and the essary land valuation, was sus- ıded by the National Government ich took office in 1931.

Taxation of land values as a special d distinct source of revenue is now ıbodied in the legislation of many ıntries e.g. Denmark, the States of ıstralia, S. Africa and the western ovinces of Canada. When land lues taxation is the only tax—all xes on industry and trade being olished—it is known as the 'Single ıx.' It was in this form that enry George (q.v.) advocated it in e best known book which expounds e theory and claims the social lvantage of turning economic rent to the public treasuries, *viz.*, *Pro- ess and Poverty*, written in 1879. eagues and associations exist in ractically every country to promote ıis teaching.

LANDWEHR, a term applied to ertain classes of conscripted troops ı Germany, Austria, Russia, and witzerland. In Switzerland the andwehr is the second line, to which man is drafted for 12 years on the xpiry of his line and reserve service. he German and Russian Landwehr ere also second-line forces, and the ustrian was an overflow force for roops supernumerary to line establishment or requirements.

LANE, Lupino, English actor and crobat. He was born 16th June, 1892, nd made his first London appear- nce as "Nipper Lane" in 1903. He s a member of the famous Lupino amily noted for its acrobatic skill ince 1780 and is himself an expert crobat.

LANFRANC, Archbishop of Canerbury, son of a wealthy citizen of Pavia, Italy, born 1005, died 1089. He became a monk of the Benedictine bbey of Bec in 1042, and prior in 046. In 1062 William of Normandy nade him Abbot of Caen, and after he Conquest he became Archbishop of Canterbury (1070). He did much to ourify and reform the Church, at the ame time preserving its insular independence. He enjoyed the confidence of William I, and promoted he peaceable succession of William Rufus, under whom he exercised the chief authority till his death. His writings were printed in 1647, and again at Oxford in 1844.

LANG, Alexander Matheson, British actor. Born in Montreal, 15th May, 1879, the son of a Scottish minister, he was educated at Inverness and St. Andrews, and in 1897 first appeared on the stage. Under F. R. Benson he played Shakespearean characters with much success and he soon became prominent. He took a company to Australia and S. Africa and as a producer was responsible for *Mr. Wu*, *Othello*, *Carnival* and *The Wandering Jew*, in all of which he himself appeared. His other successes included Charles Surface in *The School for Scandal*; John Storm in *The Christian*; and he also played in *Jew Süss* and *Elizabeth of England*. Lang has also taken part in productions for the films.

LANG, Andrew, Scottish author, born at Selkirk 1844, died 1912. He was educated at Edinburgh Academy, St. Andrews, and Balliol College, Oxford, subsequently becoming an honorary Fellow of Merton College, Oxford, and a Fellow of the Royal British Academy (1906). He was a most versatile writer, producing upwards of sixty books, in addition to an enormous number of casual essays and journalistic articles published in Great Britain and in the United States.

He published several volumes of ballads and light verse, including *Ballads and Lyrics of Old France* (1872), *Ballads in Blue China* (1880), and *Ballads of Books* (1888). He made valuable contributions to the literature of mythology in *Custom and Myth* (1884) and *Myth, Ritual, and Religion* (1887). In collaboration with Professor Butcher he translated the *Odyssey*; with Myers and Walter Leaf, the *Iliad*; and he collaborated, in *The World's Desire*, with Sir Rider Haggard.

The following are others of his most important works: *Grass of Parnassus* (1888), *How to Fail in Literature* (1890), *Ban et arrière Ban* (1894), *The Homeric Hymns* (1899), *History of Scotland from the Roman Occupation*, *Prince Charles Edward* (1900), *Magic and Religion* (1901), *Mystery of Mary Stuart* (1901), *Homer and his Age* (1906), *A Defence of Sir Walter Scott and the Border Minstrelsy* (1910).

LANG, Cosmo Gordon, Archbishop of Canterbury, was born in 1864. After being Vicar of St. Mary's, Oxford, Vicar of Portsea, Canon of St. Paul's, and Bishop of Stepney, he was in 1908 appointed Archbishop of York, and twenty years later Archbishop of Canterbury.

LANG, John Thomas, Australian politician. Born in Sydney, 21st Dec. 1876, he became mayor of Auburn and a prominent figure in the Labour movement. In 1913 he entered the legislative assembly of New South Wales where he became leader of the Labour party. From 1920–22 he was Treasurer and from 1925–27 he also held the office of Prime Minister. In 1930 Lang again became Prime Minister, and he was prominent during the financial crisis of 1931, when he advocated the policy of repudiation, and in March refused to find money for the interest due in London on New South Wales loans. During 1931 and 1932 he carried on a struggle against the government of the Commonwealth that passed legislation to compel New South Wales to meet its liabilities, but in 1932 the general election went against him, and he left office.

LANGDALE, two valleys in the Lake District. **Great Langdale** is near Grasmere and is 5 miles long. At Elterwater it meets **Little Langdale,** a somewhat shorter valley. Two pikes at the top of Great Langdale are known as the Langdales, they are Harrison Stickle (2,400 feet) and Pike o' Stickle (2,330 feet). A village in Great Langdale is called **Langdale.** It is 4 miles from Ambleside.

LANGELAND, an island of Denmark between Laaland and Fünen, about 30 miles in length and from 3 to 5 miles in breadth; area, 106 sq. miles; pop. about 20,000. Rudkjöping is the chief town, and has railway connections. Dairy-farming is an extensive industry; legumes, cereals, and other farm crops are raised.

LANGENSALZA, a town of Prussia, in Saxony.

LANGHOLM, burgh of Dumfriesshire. Is on the Esk, 20½ miles from Carlisle, on the L.N.E. Rly. **Old Langholm** is on one side of the river and **New Langholm** on the other. The burgh is noted for its sheep fairs and tweed is manufactured. Near is **Langholm Lodge,** a seat of the Duke of Buccleuch. Pop. (1931), 2,448.

LANGKAT, a town of Sumatra, on the north part of the east coast, with a port. It possesses petroleum wells, from which large shipments are made.

LANGLAND, William, the supposed author of the English poem *The Vision of William concerning Piers Plowman,* was born about 1332 perhaps at Cleobury-Mortimer, Shropshire, and is traditionally reported to have been a secular priest, educated at Oxford. From internal evidence it is gathered that the poem, in its earliest form, was composed about 1362. Its rhythmical structure depends upon alliteration, which forms a substitute for rhyme. The poem is allegorical in form and satirical in spirit; the trials and troubles of life generally, but more particularly the corruptions of the Church and the worldliness of the ecclesiastical order, are its theme. *The Crede of Piers Plowman* is an imitation of Langland's work which appeared about the end of the fourteenth century. It is written by a follower of Wycliffe.

There are three chief texts of *Piers Plowman,* to which are assigned the respective dates of 1362, 1377, and 1392—all published by the Early English Text Society, Professor Skeat being editor. He also published a parallel text edition (2 vols., 1886). *Piers Plowman* is of value for its pictures of old English life, and of very great importance for the study of English in its earlier forms. Langland is believed also to be author of a poem written in 1399, which Skeat called *Richard the Redeles.*—Cf. J. A. A. J. Jusserand, *A Literary History of the English People.*

LANGRES (lân-gr), a town of France, department of Haute-Marne, near the left bank of the Marne, and S.S.E. of Chaumont. It occupies a steep hill commanding the entrance from the basin of the Saône into that of the Seine, and is a fortress of the first class. It was known to the Romans as Andematunum, and is believed to have derived its name from the Celtic people Lingones, who occupied the town in Cæsar's time. It has a cathedral, chiefly Romanesque, but partly Gothic, dating from the twelfth century. Pop. 10,090.

LANGSIDE, now a southern suburb of Glasgow, included in the municipality in the parish of Cathcart, formerly a small village where the troops of Mary Queen of Scots were utterly defeated by the Regent Murray on 13th May, 1568. It was from Langside that Mary fled to England, and a monument commemorates the battle.

LANGTON, Stephen, English cardinal, and Archbishop of Canterbury in the reign of John, born about 1150, died 9th July, 1228. In 1206 Innocent III created Langton a cardinal and nominated him to the see of Canterbury, consecrating him archbishop in the following year. King John refused to accept him, and it was only after England had been placed under an interdict and John excommunicated and threatened with deposition that he yielded. Langton was acknowledged in July, 1213, and in August he joined the insurgent barons and acted with them in compelling John to sign Magna Charta.

crowned Henry III, and in 1223 demanded of him the full execution of the Charter. He was the author of some theological treatises.

W. Stubbs, *Historical Introduction to the Rolls Series.*

LANGTRY, Lily, English actress. Born in Jersey, 13th Oct., 1852, she was the daughter of a clergyman there, Rev. W. C. Le Breton. In 1874 she married Edward Langtry, and in 1881 she appeared on the London stage, where her beauty and ability soon made her the most popular actress of the day. She retained for many years a great favourite, her successes including parts in *She Stoops to Conquer, Macbeth,* and *As You Like It.* She played also in South Africa and the United States and for a time managed the London theatre. She also owned racehorses. Her second husband was Sir Hugo de Bathe. She died 12th Feb., 1929.

LANGUAGE, any expression of thought, specifically the verbal utterance developed by mankind from inarticulate gesture into articulate speech for recording and communicating ideas. Language is not heritable, but acquired by each individual after birth. It may comprise isolated, agglutinative and inflected, or analytic and synthetic forms. Developed in various primary areas, these passed into local dialects by migration and settlement, being classifiable into major groups such as Indo-European, Semitic, Hamitic, Altaic, Austric, Bantu, Amerind and the like. Dialectic branches are especially abundant in isolated regions, *e.g.*, mountain valleys and islands. Sign language and drum language are conventional modes of communication independent of the tongue.

LANGUEDOC (lân-gè-dok), one of the pre-Revolutionary provinces of Southern France, now forming the departments of Aude, Tarn, Hérault, Lozère, Ardèche, and Gard, as well as the arrondissements of Toulouse and Villefranche, in the department of Haute-Garonne; and the arrondissements of Puy and Yssingeaux, in the department of Haute-Loire.

LANGUE D'OC (lân-gè-dok), the name given to the independent Romance dialect spoken in Provence in the Middle Ages, from its word for *yes* being *oc,* a form of the Latin *hoc.* It was thus distinguished from the language spoken by the natives of the north of France, which was called *Langue d'oui* or *Langue d'oil,* their affirmative being *oui* or *oil.* The *langue d'oc* was the language of the Troubadours, and is known also as *Provençal.*

LAN'KESTER, Sir Edwin Ray, British scientist, born 15th May, 1847. Educated at St. Paul's School and at Oxford, he was lecturer at Exeter College, Oxford, and subsequently was professor of zoology at University College, London, and Linacre professor of comparative anatomy at Oxford (1891–8). From 1898 to 1907 he was director of the Natural History Museum, South Kensington, and was knighted in 1907. He founded the Marine Zoological Association, and was president of the British Association in 1906. His numerous works, wherein he follows the theories of Darwin and Huxley, include: *Degeneration, The Advancement of Science, The Kingdom of Man, Half-hours with the Microscope, Secrets of the Earth and Sea,* and *Science from an Easy Chair.* He died in 1929.

LANNES (lân), **Jean, Duc de Montebello,** Marshal of France, born at Lectoure 1769, and was mortally wounded 21–22nd May, 1809, during the battle of Aspern-Essling. He died 31st May, 1809, at Vienna. Of humble parentage, Lannes was by trade a dyer, but he enlisted in 1792 and served in Spain and in Italy, where, in 1796, he held a command as brigadier-general.

He accompanied Napoleon to Egypt in 1798, but returned to Italy in 1800 and gained the victory of Montebello. That of Marengo was mainly due to the strategy and daring of Lannes. In 1801 he became Envoy to Portugal, and subsequently had a chief command at Austerlitz, Jena, and Friedland (1805–7), and in 1808 he marched into Spain and took Saragossa.

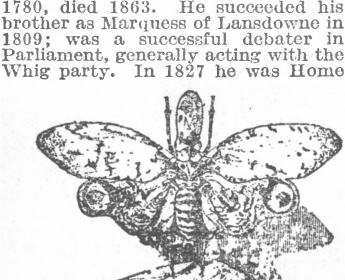
LANREZAC, Charles Louis, French soldier. He was born in Guadeloupe, 31st July, 1851, and entered the army. He passed through the school of war and made a reputation as a student of strategy. He rose to the rank of general, and in 1914, when war broke out, he was a member of the Council of War and head of the 5th army. He led his army at the battle of Charleroi, but he did not agree with the French plan of campaign, and his relations with Joffre were bad. On 3rd Sept his command was taken from him. He died 18th Jan., 1925.

LANSBURY, George, English politician. Born 21st Feb., 1859, he emigrated when young to Australia. Having returned to England in 1885, he became known as a socialist politician. In 1903 he was elected to the borough council of Poplar, which he also represented on the London County Council. From 1910–12 he

was Labour M.P. for Bow and Bromley and he was again elected in 1922 and at subsequent elections. From 1929–31 he was First Commissioner of Works and in 1931, when nearly all the Labour leaders had lost their seats in Parliament, he was selected to lead the opposition.

LANSDOWNE, William Petty, first Marquess of, better known as Earl of Shelburne, born 1737, died 1805. He began political life in 1763; became Prime Minister in 1782, but was driven from power by the Fox and North coalition. In 1784 he was made Marquess of Lansdowne.

His second son, Henry Petty, born 1780, died 1863. He succeeded his brother as Marquess of Lansdowne in 1809; was a successful debater in Parliament, generally acting with the Whig party. In 1827 he was Home



Lantern-Flies

Secretary; from 1831 to 1841 President of the Council. He was leader of the opposition in the House of Lords from 1841 to 1846, when he entered the Cabinet of Lord John Russell as President of the Council. In 1852 he declined the premiership.

LANSDOWNE, Henry Charles Keith FitzMaurice, fifth Marquess of, was born 1845, and succeeded to the marquessate in 1866. He was Governor-General of Canada from 1883 to 1888, of India from 1888 to 1893, Secretary for War from 1895 to 1900, and Foreign Secretary from 1900 to 1905. He was Unionist leader in the House of Lords from 1906 to 1914. In 1915 he joined the Coalition Government as Minister without portfolio, but resigned in 1916, as he was not in accord with his colleagues on the Irish question. In Nov., 1917, he advocated overtures for peace with Germany in a letter published in *The Daily Telegraph*. He died in 1927.

LANSING, Robert, American lawyer-diplomatist, born 1864, was admitted to the Bar in 1889, and represented the United States in Behring Sea Arbitration of 1892 He came into prominence as an int national negotiator, and was f quently retained by the United Sta in this capacity. During 1914–5 was Counsellor for the Department State, and replaced W. J. Bryan 1915 as Secretary of State und President Wilson. He accompani the American Peace delegation Versailles as Commissioner. Owi to a dispute with President Wilson, resigned in 1920. He died in 1928.

LANSING, a town of the Unit States, capital of Michigan, on Gra River, north-west of Detroit. It h a large State house with a library over 100,000 volumes, an agricultur college, and many important man factures. Settled in 1837, it became city in 1859. Pop. (1930), 78,397.

LANSQUENET, a French car game, deriving its name from t German *Landsknecht* (q.v.), who intr duced it into France in the fifteent century.

LANTERN, in architecture, (1) a erection on the top of a dome, on th roof of an apartment, or in simila situations, to give light, to promot ventilation, or to serve as a sort c ornament. (2) A tower which has th whole or a considerable portion of th interior open to view from the ground and is lighted by an upper tier o windows, such as the towers com monly placed at the junction of th cross in a cruciform church; also a light open erection on the top of a tower.

LANTERN, MAGIC. *See* OPTICAL LANTERN.

LANTERN-FLIES, tree-bugs allied to the cicadas, but forming a family by themselves, the Fulgoridæ. They are remarkable for the prolongation of their forehead into a snout-like expansion that appears to be a leaping organ.

The lantern-fly proper (*Fulgŏra lanternaria*) is a native of South America. It is more than 3 inches in length, and 5 inches across the wings. It has been asserted that it emits a strong light from the inflated expansion of the forehead, but the evidence of this luminosity is more than doubtful. They are in fact reported to fly only during sunlight and not to appear abroad during dark. A Chinese species has, on equally equivocal testimony, been called *F. candelaria*.

LANTHANUM (symbol, La; atomic weight, 139·0). An element resembling cerium, belonging to the group known as the rare earth metals, found in the monazite sand of Travancore, India, and of Bahia and Espirito Santo,

Brazil. It is found associated with didymium in the minerals cerite and lanthanite. The element is obtained from its compounds by electrolysis of fused lanthanum chloride, ($LaCl_3$), and is one of the most chemically active of the rare earths. It exhibits pyrophoric properties like cerium.

LANZAROTE (lăn-sá-rō'tā), the most north-eastern of the Canary Isles; greatest length, 36 miles; mean breadth, 15 miles. Its coast is generally bold, and the hills in the centre rise to an elevation of 2,000 feet. The island is of volcanic origin, and one volcano is still active. It produces grapes, &c. The capital is Arrecife. Pop. 17,000.

LAOCOON (lā-ok'o-on), in ancient Greek legend, a priest of Poseidon (Neptune), among the Trojans, who, along with his two sons, was killed by two enormous serpents sent by Apollo. The story has frequently furnished a subject to the poets, but it is chiefly interesting as having served as the subject of one of the most beautiful groups of sculpture in the whole history of ancient art. It was discovered at Rome among the ruins of the palace of Titus in 1506, and is now in the Vatican Museum. According to Pliny, the group was the work of three sculptors of Rhodes, a father and two sons, Agesander, Polydorus, and Athenodorus. Their date has now been established by the discovery in Rhodes of a statue of a priest of Athena, the date of which is 42 B.C., and which is undoubtedly the work of Agesander and Athenodorus. The statue, therefore, antedates Virgil's narrative in the *Æneid*.—Cf. E. A. Gardner, *Handbook of Greek Sculpture*.

LAODAMIA, character in Greek legend. The wife of Protesilaus, who was killed during the siege of Troy, she implored the gods to allow him to return to her from Hades for three hours. On his return to Hades she died and so went with him.

LAODICE'A, the ancient name of several places in Asia Minor. One of these, now called **Eski Hissar** (Old Castle), 120 miles E.S.E. of Smyrna (Izmir) was the site of one of the seven primitive Christian churches of Asia. Another is now known as **Latakia**.

LAON (lăn; ancient **BIBRAX SUESSIONUM**), a town of France, capital of the department of the Aisne, 87 miles north-east of Paris. It is situated on a height in the midst of a level country, and has interesting old buildings, especially the former cathedral, which dates from the twelfth century. Laon was the seat of a bishopric as early as A.D. 500, and was made the capital of his kingdom by Charles the Simple of France about 900. Bonaparte was defeated here in 1814. On the 9th Sept., 1870, it surrendered to the Germans without a blow being struck. Laon is an important fortress, and was captured by the Germans during the European War on 30th Aug., 1914, remaining in the enemy's possession for over four years, when it was retaken by the French on 13th Oct., 1918. Pop. 19,125.

LA'OS, a French protectorate, tributary to Indo-China, but governed by a king and advised by a French Resident, administrative expenses being borne by Cochin-China, Annam, Tonkin, and Cambodia. The protectorate was declared in 1892–3, but part of the Prabang territory was restored to Siam 28th March, 1907. The area is about 89,320 sq. miles, and the population in 1931 was 944,000. Vientiane is the capital. There are three districts, Luang Prabang a protected state, and the residence of the king, Bassac, and Muong Sing, and cotton, rice, tobacco, indigo, and fruit are produced. Gold and precious stones are being worked by French concessionaires.

LAO-TZE, or **LAO-TSEU**, sometimes also called **LAO-KIUN**, Chinese philosopher, founder or reformer of one of the most ancient and important religious sects of China, known as the Tao, or sect of reason. Born about the year 600 B.C., he was historiographer and librarian to a king of the Chow dynasty; he travelled to the borders of India, where he may have become acquainted with Buddhism; he met Confucius and reproached him for his pride, vanity, and ostentation; he was persuaded to record his doctrines in a book, which he did in the *Tao-ti-king*, or *The Path to Virtue*; and, on completing this task, he disappeared into the wilderness, and there, it is said, ascended to heaven.

According to him, silence and the void produced the Tao, the source of all action and being. Man is composed of two principles, the one material and perishable, the other spiritual and imperishable, from which he emanated, and to which he will return on the subjugation of all the material passions and the pleasures of the senses.

Lao-tze's moral code is pure, inculcating charity, benevolence, virtue, and the freewill, moral agency, and responsibility of man. From the insight and deep wisdom of his moral code it has been supposed that Lao-tze had been indebted to Western teaching, but there is no clear proof of this. Since the second century of our era the sect has continued to extend over

China, Japan, Cochin-China, Tonquin, and the Indo-Chinese nations.

LAPAGERIA, a genus of Chilian climbing plants, ord. Liliaceæ. *L. rosea,* with handsome red or white flowers, is a great ornament of the greenhouse.

LA PAZ, the principal commercial city of Bolivia, and the focus of all Bolivia's chronic political disturbances. Grandly situated at the lower end of Lake Titicaca, it lies in a deep hollow, and far above towers the summit of Illimani (q.v.). Its Plaza de 16th Julio is 12,000 feet above sea-level, and train passengers are provided with oxygen to enable them to withstand height sickness, &c. The old palace of the Spanish Governors has become an hotel; the cathedral is unfinished, and the local diversion (apart from politics) is bull-fighting. La Paz, founded 1548, contains a university, a museum and a mineralogical museum, a wireless station, and a railway station in connection with Huagui (Titicaca), whence steamers maintain a service with the Peruvian terminus at Puno. Pop. (1929), 146,930.—The province of La Paz has an area of 40,686 sq. miles, and a population of 736,985.

LA PÉROUSE (pā-rōz), **Jean François Galaup,** Comte de, a French navigator, born 22nd Aug., 1741, died in 1788. In 1785 he left France in charge of a Pacific exploring expedition, and, having visited parts of its western and eastern coasts and sundry of its islands, the expedition arrived in Botany Bay in 1788. Here La Pérouse left a letter, in which he declared his intention of proceeding to the Isle of France, but nothing more was heard of him. In 1826, however, an English captain, Dillon, found some remnants of the wreckage of La Pérouse's ships in possession of the inhabitants of Vanikoro, one of the New Hebrides. In 1828 an expedition sent out under Dumont d'Urville discovered that La Pérouse's two vessels, the *Boussole* and *Astrolabe,* struck on a reef in the New Hebrides, and that the crews were either drowned or murdered.

LAPIS LAZ'ULI, a rock mainly composed of an aluminous sodium calcium silicate with some sulphur, of a rich azure-blue colour. The finest specimens are brought from China, Persia, and Central Asia, and it is must esteemed for ornamental purposes, especially for inlaid work. From it the pigment called ultramarine is prepared, but this is now also manufactured artificially.

LAPLACE (lá-plās), **Pierre Simon,** Marquis de, a celebrated French mathematician and astronomer, born 1749, died 1827. At an early a he showed wonderful aptitude mathematics; became professor mathematics at the École Militai subsequently went to reside in Pa and there made the acquaintan of d'Alembert. Under his guidan Laplace soon distinguished hims by discovering the invariability the mean distances of the plan from the sun. He was appoint examiner of the Royal Corps Artillery, and at the early age twenty-four was admitted into t Academy of Sciences.

During the Revolution Laplace w an extreme Republican, and in 17 he was nominated to the Ministry the Interior—a position which l filled so badly that he was supersed in six weeks. Receiving the patronag of Bonaparte, he was made Presider of the Senate, and in 1806 raised t the dignity of Count of the Empir Notwithstanding these favours, h deserted the emperor in 1814, vote for the establishment of a Provisiona Government, and was rewarded b the Bourbons with the title of marqui In 1816 he was named a member o the French Academy.

Almost any one of Laplace's origina researches is alone sufficient to stam him as one of the greatest of mathe maticians. The discovery of the invari ability of the major axes of the plane tary orbits, the explanation of th great inequality in the motions o Jupiter and Saturn, the solution o the problem of the acceleration of th mean motion of the moon, the theory of Jupiter's satellites, and other im portant laws are due to Laplace. The most important of his works are: the *Mécanique céleste, Système du monde, Théorie analytique des probabilités,* and *Essai sur les probabilités.*—Cf. D. F. J. Arago, *Biographies of Scientific Men.*

LAPLACE'S EQUATION, in mathematical physics, is the partial differential equation $\frac{d^2V}{dx^2} + \frac{d^2V}{dy^2} + \frac{d^2V}{dz^2} = 0$. The independent variables x, y, z are the Cartesian co-ordinates of a point in space. In Laplace's original investigations the function V was the gravitational potential (q.v.) of a body at any point (x, y, z) external to it. Among other functions which satisfy the equation are (*a*) the potential in an electrostatic field at a point where there is no charge, and (*b*) the steady temperature in a body through which heat is flowing. *See* POTENTIAL; SPHERICAL HARMONICS.

LAP'LAND, the geographical term for the land of the Lapps. The word means more when considered ethnographically, for Lapland has actually

no political existence as a separate or even a clearly defined state, but runs roughly west to east from Norway over the north of Sweden and part of Finland to the Russian Kola Peninsula. The climate for nine months of a dark winter is excessively cold; spring and autumn are short; and the summer of two months, when the sun never sets, is extremely hot. Vegetation is scanty, except in the form of birch, pine, fir, and the abundant mosses which supply food for the herds of reindeer.

The Lapps themselves belong to the Finnic branch of the Turanian family, and the Finns dwelling in Torne (Sweden) are ethnologically not very far removed from them. They are a small, muscular, large-headed race, with high cheek-bones, wide mouth, flat nose, and scanty beard, and many are of nomadic habits, although the tendency towards intermarriage with the Finns and Swedes has done much towards converting them to a settled, semi-agricultural life. They are generally very ignorant, simple-hearted, and hospitable.

The Norwegian Lapps belong to the Lutheran, and the Russian Lapps to the Greek Church. Their numbers do not exceed 30,000, of which about 19,000 are registered in Norway, 7,162 in Sweden, and 2,113 in Finland. —BIBLIOGRAPHY; F. H. Butler, *Through Lapland with Skis and Reindeer*; E. Rae, *The White Sea Peninsula*.

LA PLATA, a city of the Argentine, situated on a fine natural harbour called Ensenada, in the La Plata estuary, 40 miles below the city of Buenos Aires, and connected with it by rail. Founded in 1882 as the capital of Buenos Aires province, it has become an important commercial centre, having a palace for the Legislative Assembly, a cathedral, a national university, and public park. Pop. (1931), 182,401.

LAPORTE, a city of the United States, capital of Laporte county, Indiana, 60 miles south-east of Chicago. The neighbourhood has become a favourite resort of summer visitors on account of its beautiful lakes. Pop. 15,755.

LAPWING, PEEWIT, or **GREEN PLOVER,** a bird belonging to the plover family. The common lapwing (*Vanellus cristātus*), a well-known British bird, is about the size of a pigeon; it is often called the *peewit* from its peculiar cry. In the breeding season these birds disperse themselves over the interior of the country, where they lay their eggs in a small depression of the ground, in cultivated fields, moors, &c. Both eggs and young are protectively coloured, harmonizing with their surroundings so as to be inconspicuous. In winter they retire to the sea-coast. Lapwings destroy great numbers of insects, and are beneficial to agriculture. Their eggs are considered a luxury, and many are annually sent to the London markets.

LAR'AMIE, a town of Wyoming, United States, in the south-east of the state in an elevated region, at the height of 7,100 feet, beside the Laramie Plains, River, and Mountains. Pop. (1930), 8,609.

LARAMIE SERIES, the youngest member of the Cretaceous system in the west-central region of the United

Lapwing

States, consisting mostly of strata laid down in fresh or brackish water, and including much lignite. It forms an important link with the local terrestria Eocene system; dinosaurs, however, often of large size, continued to live in Laramie times, in contrast with the mammalian life of the Cainozoic series.

LARBERT, village and parish of Stirlingshire. It is just outside Falkirk on the River Carron and 27½ miles from Edinburgh. It is a railway junction. Pop. (1931), 12,389.

LAR'CENY is the stealing of the personal property of another person. To constitute this crime the removal of the goods to any distance is not necessary, but it requires to be shown that the article has completely passed, for however short a time, into posession of the criminal with intent to deprive the owner of it.

Concerning the kind of things the appropriation of which is larceny, the common law restricted them to personal property which could be moved, as distinguished from real estate which could not, but this distinction has been to some extent abol-

ished by recent statutes. Larceny was formerly divided into two kinds, grand and petty, or the difference between articles above and below the value of 12 pence, but this distinction has now been abolished.

At one time the punishment for grand larceny was death; later it was restricted to transportation; now the punishment for larceny is imprisonment with or without hard labour, or penal servitude.

LARCH, the common name of trees belonging to the genus Larix, nat. ord. Coniferæ, having deciduous leaves, small erect, oval, blunt-pointed cones and irregularly margined scales.

The common larch (*L. europœa*), though a native of Italy, Switzerland, and South Germany, is one of the most frequently cultivated trees in Britain, and is remarkable for the gracefulness of its conical growth, and the durability of its wood. It suffers greatly, especially when grown at low altitudes, from the larch-canker fungus, *Dasyscypha Willkommii*. Besides the common larch, there are the Russian larch, the red larch, and the black larch (*L. americana*), a native of America. The last species has also the name of *hackmatack* or *tamarack*.

LARD is obtained from the fat of swine when it is heated to boiling-point and then strained. It is chiefly composed of olein and stearin, and is now largely used in the manufacture of candles, soap, pomades, &c. The best quality is found in the fat which urrounds the kidneys, and this is employed in pharmacy for the preparation of unguents. When subjected to pressure the olein is liberated, forming lard-oil, which is much used as a lubricant for machinery.

LA'RES, a class of tutelary spirits or deities (domestic and public) among the ancient Romans. All the household lares were headed by the *lar familiaris*, who was revered as the founder of the family. In the mansions of the rich the images of the lares had their separate apartment. When the family took their meals, some portion was offered to the lares, and on festive occasions they were adorned with wreaths.

LARGO, seaport of Fifeshire. It is on Largo Bay, an opening of the Firth of Forth, 3½ miles from Leven. It has a fishing harbour, and remains of a castle. Largo Law is a hill near, 960 ft. high. Pop. 3,215.

LARGS, a seaside burgh of Scotland, county of Ayr, on the Firth of Clyde. In 1263 Alexander III defeated the Norwegians under Hako in the vicinity, and a stone erection perpetuates the victory. The ancient castles of Fairlie, Skelmorlie, Knock, and K burne stand near the town, which i favourite seaside resort of Glasg residents. Pop. (1931), 6,115.

LAR'IDÆ, the family of aqua birds popularly known as the sea-gu sea-mews, or gulls, and of which t genus Larus is the type. The sku skimmers, and terns are also includ *See* GULL.

LARISSA (*Yeni Shehr* in Turkis a town of Northern Greece, on t River Peneus (now Salambria), t capital of Thessaly. It is the seat of a archbishopric, with an importa trade and industries, and is connect by rail with the seaport Volo. It is place of great antiquity, and w ceded to Greece in 1881. Pop. 23,89

LARK, the common name of perc ing birds of the family Alaudidæ. The are characterized by a short, stro bill; nostrils covered with feather forked tongue; long, straight hin claw; and the power to raise th feathers on the back part of the hea in the form of a crest. Their distribu tion throughout the Old World i general, but one genus (Otocorys) i American and another (Mirafra ranges into the Australian regior They are terrestrial in their habit feed upon worms, larvæ, &c., nest upo the ground, and bring forth a broo twice in the year. The best known i the sky-lark (*Alauda arvensis*), whic is celebrated for the prolonged beaut of its song. The wood-lark (*Lullul arborea*) is less common than the sky lark, and is known by its smaller siz and less distinct colours. It perche upon trees, and is found chiefly i fields near the borders of woods. It sings during the night, and on this account has been mistaken for the nightingale.

LARKHALL, a town of Scotland, in Lanarkshire, on the L.M.S. Railway, 3½ miles south-east of Hamilton. It is in the Lanarkshire coal-fields, and is a mining centre. Pop. 14,974.

LÁRKHÁNA, a town of India, in Sikárpur district, Sind, Bombay Presidency, situated on a fertile tract of land on the south side of the Ghár Canal. Pop. 13,700.

LARKSPUR (Delphinium), sometimes called Lark's-heel, a genus of plants of the ord. Ranunculaceæ, distinguished by its petaloid calyx, the superior sepal of which terminates in a long spur. The upright larkspur (*D. ajacis*) and the branching larkspur (*D. consolida*) are well-known garden flowers.

LAR'NAKA, or **LAR'NICA** (ancient Citium), the seaport city of Cyprus, with an ample roadstead. It is the chief commercial centre in the island.

Many inscriptions in the Phœnician language have been found at Larnaka, which is supposed to be the Biblical Kittim or Chittim. It was the birthplace of Zeno, the founder of the Stoic school of philosophy. Pop. about 10,000.

LARNE, a seaport of Ireland, County Antrim, at the entrance to Larne Lough; the Irish port of the short sea-route, Stranraer-Larne (39 miles), carried on by mail steamers. The bleaching of linen is extensively carried on, and there are large flour-mills. The harbour, about a mile below the town, is one of the best on the east coast. Larne ranks high in the list of first-class Irish watering-places. During the European War the town was practically a naval base. Pop. (1926), 9,706.

LA ROCHEFOUCAULD (rōsh-fō-kō), **François,** Duc de, Prince de Marsillac, a celebrated courtier and man of letters of the time of Louis XIV, was born at Paris 1613, and died there 1680. He distinguished himself as a soldier, but his political career was somewhat stormy. In 1652 he retired to his château, and did not return to Paris till 1661. Meantime he had abandoned the sword for the pen, and associated freely with Boileau, Racine, Molière, Madame de Sévigné, and Madame de la Fayette.

His *Mémoires,* published by the Elzévirs in 1662, and his *Reflexions ou Sentences et Maximes morales,* published anonymously in 1665, were the fruits of his literary activity. The latter contain about seven hundred maxims, which not only combine perspicuity with brevity, but are also masterpieces of a finished literary style, brimful of wit and paradox, and the work is rightly considered a French classic. The fundamental thought of the book is that self-interest is the mainspring of all human action. Many editions of these *Maximes* have been published, but the best is that of 1870 (Edition des Bibliophiles).

LA ROCHEJAQUELEIN (rōsh-zhâk-lan), **Henri du Verger, Comte de,** scion of an ancient French family of La Vendée, celebrated chief of the Vendean Royalists, was born in 1772. During the French Revolution his father and his two brothers emigrated to England, but Henri put himself at the head of the peasants of La Vendée, and gained sixteen victories in ten months. At the age of twenty-two he was shot by a Republican soldier in a skirmish at Nouaillé, 1794.

LA ROCHELLE. *See* ROCHELLE.

LARVA, the term applied in natural history to the first stage in the metamorphosis of insects, and certain other of the lower invertebrates. In insects it is equivalent to the grub or caterpillar stage. Many of the crustacea, as crabs and barnacles, echinoderms, marine worms, and even vertebrata, as frogs, toads, and newts, pass through larval forms. The larval crab was for long described as a distinct crustacean with the name of *Zoëa.* Larvæ are markedly unlike the adult forms of the species to which they belong. *See* METAMORPHOSIS.

LARYNGITIS is inflammation of the mucous lining of the larynx. The condition is usually associated with inflammation of other parts of the respiratory tract, and appears in acute or chronic form. The chief signs of an acute attack are hoarseness, leading frequently to complete loss of voice, a dry irritating cough, considerable discomfort in the throat, and usually a slight rise of temperature. The chronic form frequently follows an acute attack, but may appear gradually. The three chief factors in its production are mouth breathing, faulty voice-production, and any suppuration in the upper respiratory tract.

During an acute attack the patient should be in bed, forbidden to speak, and given inhalations. The attack usually subsides in a week. In chronic laryngitis, along with local treatment, removal of the predisposing cause is essential, then vocal rest, and the use of a lower voice register till all the symptoms have gone.

LARYN'GOSCOPE, a contrivance for examining the larynx and commencement of the trachea. It consists of a plane mirror introduced into the mouth, and placed at such an angle that the light thrown on it from a concave reflector, in the centre of which is an aperture, is made to illuminate the larynx, the image of which is again reflected through the aperture in the reflector to the eye of the observer.

LARYNX, the organ by which the voice is produced, situated at the upper part of the trachea or windpipe. The larynx is formed mainly of two pieces of cartilage, called the *thyroid* (also spelt *thyreoid*) and the *cricoid,* one placed above the other. The thyroid is formed of two extended wings meeting at the middle line in front in a ridge; above and from the sides two horns project upwards, which are connected by bands to the hyoid bone, from which the larynx is suspended. The thyroid cartilage rests and is movable upon the cricoid, moving backwards or forwards, but not from side to side. The cricoid cartilage is shaped like a signet-ring (Gr. *krikos,* a ring), the narrow

part of the ring being in front. The cricoid carries, perched on its upper edge behind, the *arytenoid* cartilages, which are of great importance in the production of the voice. These various cartilages form a framework upon which muscles and mucous membranes are disposed.

The mucous membrane which lines the larynx is thrown into folds. These folds are called the *true* vocal cords, and by their movements the voice is produced. They are called *true*, as distinct from the *false* vocal cords which are above them, but take no part in producing the voice. The true vocal cords projecting towards the middle form a chink, which is called the *glottis*. By the contraction of various muscles this chink can be so narrowed that the air forced through it throws the edges of the membrane, in other words, the vocal cords, into vibration and so produces sounds.

Variations in the form of the chink will affect changes in the sound. Thus the production of voice is the same as in musical instruments, the arrangements in the larynx being such as (1) to produce the vibratory sounds, (2) to regulate the sound, (3) to vary the pitch, and (4) to determine the quality of the sound. The rapid, delicate muscular movements involved are produced by nervous stimuli reaching the muscles from the brain. Thus the voice is produced in the larynx, and is modified by the rest of the respiratory passages. (*See* COUGH.) In the act of swallowing, the glottis is closed, and the food passes over a cartilaginous plate called the *epiglottis*.

LA SALLE, Réné Robert Cavelier, Sieur de, a famous French explorer, born at Rouen 1643, and murdered 1687. He settled in Canada in 1666, but eventually sold his trading-post in order to travel via the Ohio to China. His views gained for his post the derisive title of La Chine (q.v.); but he set off, explored the Great Lakes, &c., and returned only to equip another party, with which he reached the mouth of the Mississippi, and formally annexed the surrounding territory as *Louisiana*, after Louis XIV, in whose name he made the proclamation. After many desperate adventures he returned to France, but sailed again in 1684, and landed at Matagorda Bay in the present state of Texas, imagining that he was near the Mississippi mouth. His ships had gone, and he spent two years in searching for the route to Canada, when his followers mutinied and murdered him.

LA SALLE, a city of the United States, capital of La Salle county, Illinois, 100 miles south-west of Chicago. It has zinc-smelting works and rolling-mills. Pop. 13,149.

LAS BELA, a native state of Baluchistan, on the Arabian Sea. Area, 7,132 sq. miles; pop. 63,008.

LASCAR, Indian word used by the Portuguese for inferior army servants or camp followers, e.g. gun lascars. Long applied to Asiatic seamen, especially Indians on coasting or ocean-going vessels, it is officially recognised by the Merchant Shipping Acts as excluding non-Indians, e.g. Malays and Chinese. The Indian Government now limits it to deck hands.

LAS CASAS, Bartolomé de, a Spanish prelate and missionary, known as the Apostle of the Indians, born at Seville in 1474, died at Madrid in 1566. He accompanied Columbus to Hispaniola in 1498, and on the conquest of Cuba became priest there, and distinguished himself by his humane treatment of the natives. In his zeal for the Indians he returned to Spain several times and obtained decrees in their favour, which, however, were of little avail.

In the cause of religion he visited various parts of the New World, including Mexico, Guatemala, and Peru. In 1542 he wrote his famous *Brevisima Relacion de la Destruycion des las Indias*. His untiring labours were productive of good to the natives, yet it is a singular fact that he proposed to purchase negroes in order to supply the Cuban planters with African labourers instead of the Indians. He was translated to the bishopric of Chiapas in 1544, but resigned this dignity in 1547 and retired to Valladolid.—Cf. Sir A. Helps, *Life of Las Casas*.

LAS CASES (lás cäs), **Emmanuel Auguste Dieudonné Marin Joseph, Marquis de,** French writer, born in Languedoc in 1766, died at Passy in 1842. Before the Revolution he was a lieutenant of marines, but emigrated to England during the Terror and supported himself by private teaching. Returning to France, he employed himself upon his *Atlas historique*, published under the name of Le Sage. Coming under the notice of Napoleon, he was by him made count and Minister of State, but, by hereditary right, he was a marquis under the old régime. After Waterloo he shared Napoleon's imprisonment in St. Helena, where the emperor dictated part of his *Memoirs* to Las Cases, and took lessons from him in English.

LASCELLES, name of a famous Yorkshire family. Its head is the Earl of Harewood (q.v.), and his eldest son is called Viscount Lascelles.

LASKER, Emmanuel, German chess player, born 1868. After defeating Steinitz in 1894, he held the championship of the world till 1920, when he relinquished it in favour of Capablanca. In 1927 Capablanca was challenged and defeated by Alekhine, who thus became champion.

LASKI, Harold J., English political philosopher. Born in Manchester, 30th June, 1893, he was educated at Manchester Grammar School and New College, Oxford. From 1914–1916 he lectured in history at M'Gill University, and from 1916–1920 at Harvard and, later, Yale. Connected since 1920 with the London School of Science, in 1921 he became Vice-Chairman of the British Institute of Adult Education. He has sat on many public committees, and has published articles on political economy. In 1931 he was Visiting Professor at Yale University. He has been a member of the Fabian Society Executive since 1922.

LAS PALMAS, seaport and capital of Gran Canaria, with a fine harbour at La Luz. It is the finest city in the Canaries, a health-resort, and was the capital until 1833. There is a wireless station (Marconi system) at Melenara, with one long-distance set for communication with Spain, and another with a 250-mile radius for communicating with ships nearby. It is also a coaling-station, and has a fine sixteenth-century cathedral. Pop. (1931), 79,444.

LASSALLE (lăs'săl-lè), **Ferdinand,** a celebrated German Socialist, born at Breslau 11th April, 1825, of Jewish parents, died in 1864, He studied at Berlin University; first made himself known as a leader during the democratic troubles of 1848, and was imprisoned for a year. In 1861 he published his *System of Acquired Rights*. Thereafter he began to organize the working-classes, and was accused by the Government of sedition, when he was imprisoned for four months.

In May, 1863, he founded a Labour Union, and began that Socialist propaganda which has since become so wide-spread in Germany. In the summer of 1864 he sought rest in Switzerland, and was there killed in a duel occasioned by a love affair. Although Lassalle's writings had added but little to Marx's theories and teaching, he did a great deal for the labour movement, giving it a powerful impulse. His best-known treatise is the famous *Programme for the Working Classes*.—BIBLIOGRAPHY: E. Bernstein, *Lassalle as a Social Reformer*; G. Brandes, *Ferdinand Lassalle*; George Meredith, *The Tragic Comedians*.

LASSO, a contrivance used in Latin America, consisting of a long rope of plaited raw hide, at one end of which is a small metal ring. By means of this ring a noose is readily formed, and the lasso is then used for catching wild cattle, the lasso being cast over the animal's head or leg while the hunter is in full gallop. In the United States and elsewhere a hempen rope is favoured. The lariat is a short lasso used for picketing horses.

LAST, measure for fish. A last consists of 13,200 fresh herrings. It is used in certain ports on the east coast of Great Britain as an alternative to the cran which is used in other ports.

LAST SUPPER, Paschal meal shared by our Lord with His disciples on the eve of His crucifixion. It is commemorated throughout Christendom in the Holy Communion or Eucharist (1. Cor. x.). It has inspired painters in all ages, notably in Leonardo da Vinci's wall painting in Milan.

LASZLO DE LOMBO, Philip Alexius, British painter. Born in Budapest in 1869, he was educated there and studied art in Paris. His portraits attracted much attention and, having settled in England, he was commissioned to paint King Edward VII, Queen Alexandra and other persons of note. In 1914 he was naturalized. In 1930 he became President of the Royal Society of British Artists.

LATAKI'A, or **LADIKI'A** (anciently **LAODICEA AD MARE**), a seaport of Syria, capital of the Government of Latakia, 70 miles north of Tripolis (Lebanon), on the Mediterranean. The harbour is well sheltered, though shallow, and there is a considerable trade in silk and cotton, while Latakia tobacco is famous throughout Europe. Pop. 21,404.

LATEEN' SAIL is a triangular sail used in xebecs, feluccas, &c., in the Mediterranean, and in the dahabiehs of the Nile. It is extended by a *lateen* yard, which is slung across a mast so as to make an angle of about 45° with it, the lower portion of the yard being about a third of the whole. Vessels rigged in this way are known nautically as *lateeners*.

LAT'ERAN, one of the churches at Rome, built originally by Constantine the Great, and dedicated to St. John of Lateran. It is the episcopal church of the Pope as Bishop of Rome, and the principal church of Rome. It has a palace and other buildings annexed to it. Every newly elected Pope takes solemn possession of the church, and from its balcony the Pope

bestows his blessing on the people. The site on which the buildings of the Lateran stand originally belonged to Plautius *Lateranus*, who was beheaded by Nero (A.D. 66): hence the name. The palace of the Lateran was the residence of the Popes from the fourth century until their migration to Avignon. After their return to Rome the Popes removed to the Vatican. The modern palace of the Lateran contains two museums, the Musco Profano and the Musco Christiano.—Cf. A. J. C. Hare, *Walks in Rome*.

LATERAN COUNCILS, councils of the Roman Catholic Church, so called because they were held in the Lateran Church in Rome. There were eleven such councils, five of which were œcumenical, the most important being that convened by Alexander III, 2nd March, 1179, which established the form under which the Popes are elected, and that called by Innocent III in Nov., 1215, which ordered the Crusade, condemned the Waldenses, and declared transubstantiation to be a doctrine of the Church.

LATERITE (Lat. *later*, a brick), a hard rubbly crust on rocks of various natures, produced by their alteration under the alternations of sunshine and rain in tropical climates. Aluminium silicates and iron compounds become broken up, silica being removed in solution; the residual laterite consists very largely of aluminium hydroxide stained by iron rust. The name was first given to altered basalt in India, and laterite has since been studied in Madagascar, Central Africa, and many tropical lands, and in the red zones among the basaltic lavas of early Cainozoic age in the north of Ireland.

LATEX, a milky juice exuded by certain plants when wounded. It is contained in special latex-tubes, which usually form a meshwork of intercommunicating vessels, as in Compositæ and Papaveraceæ, but sometimes represent separate enormously elongated and branched cœnocytes, as in Euphorbiaceæ. Latex is usually white, but may be yellow (Chelidonium) or red (Sanguinaria). Its components are varied, and include nutritive substances (oil, protein, starch), alkaloids, india-rubber, &c. As latex coagulates on exposure to air, and usually contains poisonous or bitter ingredients, its principal functions are probably protection and the healing of wounds.

LATHE. *See* MACHINE TOOLS.

LATHOM, village of Lancashire. It is 3 miles from Ormskirk and was once a market town.

Lathom House, the seat of the Earl of Lathom, was formerly a castle and a seat of the Stanleys, from whom it passed in 1730. In 1645–46 the castle was defended by Charlotte, Countess of Derby, on behalf of Charles I, but she was compelled to surrender it after a prolonged siege. It was then destroyed. The present house was built in the 18th century.

The title of **Earl of Lathom** was given in 1880 to Edward Bootle-Wilbraham, 2nd Baron Skelmersdale, who represented the two old families whose names he bore.

LATH'YRUS, a large genus of elegant plants, natives of the northern hemisphere and of South America, nat. ord. Leguminosæ. Many are ornamental, such as the sweet-pea (*L. odorātus*) and the everlasting-pea (*L. latifolius*), and some useful as agricultural plants.

LAT'IMER, Hugh, an English prelate, reformer, and martyr, born about 1485 at Thurcaston, near Leicester, died in 1555. He entered Cambridge University about 1505, and became M.A. in 1514. He took holy orders, and preached the Protestant dogma, in which he was vigorously opposed. He was made chaplain to Henry VIII in 1530, and during the ascendancy of Anne Boleyn in 1535 he was translated to the bishopric of Worcester.

In 1539 he resigned his bishopric to avoid acceptance of the Six Articles, and was imprisoned, but on the accession of Edward VI he was released and became highly popular at court. Upon the accession of Mary, Latimer was cited to appear, with Cranmer and Ridley, before a council at Oxford, and condemned. After much delay and a second trial Latimer and Ridley were burned at the stake, 16th Oct., 1555. His preaching was popular in his own time for its pith, simplicity, and quaintness.

LATIN, language of the Romans and one of the great classical languages of the western world. It belongs to the Indo-European group and was spoken by the Latini, a people living in central Italy some centuries before Christ. It became the language of the Romans and in it their great literature was written. The century before Christ and the early years of the Christian era were its great age. To this time belong Virgil, Cicero, Horace and the other great writers of classical Latin.

It is impossible to exaggerate the influence of the Latin language on literature in the west of Europe and in North America. It is the foundation of French, Italian, Spanish and other romance languages, and has contributed largely to the development of English. It became the language of the Church and of educa-

on, and in consequence the language botany and other sciences. For ng, education following the monastic adition was conducted in Latin, and ar public schools show signs of this ıfluence to-day.

LATINS (*Latini*), the ancient inabitants of Latium, in Italy. In ery early times the Latins formed a ague of thirty cities, of which the own of Alba Longa, said to have been uilt by Ascanius, the son of Æneas, ecame the head. Rome was originlly a colony of Alba, and thus the anguage of the Romans is known as he Latin language

LATIN UNION, a monetary conention instituted in 1865, between rance, Italy, Belgium, and Switzerand, for an identical coinage (though ıot as regards the actual stamping), vhich was to be recognized as legal ender in the territory of each of the parties; in 1868 it was also joined by Greece. *See* BIMETALLISM.

LATITUDE, one of the co-ordinates ıised to specify the position of a point on a sphere. **Celestial latitude** is the angular distance of a heavenly body from the ecliptic. **Geographical latitude** is the angular distance of a place on the earth's surface from the equator, measured along the meridian of the place (in degrees, minutes, and seconds). The latitude is therefore equal to the altitude of the pole, which may be found indirectly from observations of a circumpolar star.

The usual method of determining latitude at sea is to observe the meridian altitude of the sun. Greenwich time is known from the chronometer or by wireless, so that the declination of the sun can be found from the nautical almanac. From the sun's declination and meridian altitude the latitude is found by a simple addition or subtraction.

Places near the equator are said to be in *low* latitudes, those near the pole in *high* latitudes. *Parallels* of latitude are imaginary circles drawn upon the earth, parallel to the equator. The length of a degree of latitude is variable, on account of the earth's deviation from perfect sphericity; near the equator a degree is 68·7 miles, near the poles 69·4 miles. *See* SURVEYING.

LATITUDINARIANS, a term applied to certain English divines of Charles II's time, who endeavoured to allay the contests that prevailed between the Episcopalians and the conjoint Presbyterians and Independents, and also between the Arminians and Calvinists. At present the term generally denotes one who commends or sanctions deviations from the strict principles of orthodoxy.

LA'TIUM, the ancient name applied to a district of Central Italy on the Tyrrhenian Sea, extending between Etruria and Campania, and inhabited by the Latini, Volsci, and Æqui.

LATO'NA (by the Greeks called *Letô*), in Greek mythology, the mother of Apollo and Artemis. She was worshipped chiefly in Lycia, Delos, Athens, and other cities of Greece.

LATOUR D'AUVERGNE, Théophile Malo Corret de, French soldier, born at Carhaix, Brittany, 1743, died 1800. He enlisted in 1767, and became aide-de-camp to the duc de Crillon, distinguishing himself at Mahon in 1782. In the early days of the Revolution he was captain of grenadiers, but steadily refused promotion. His intrepidity and his Spartan-like existence, no less than his inherent modesty, became traditional throughout the French armies, and Carnot obtained from Napoleon, then First Consul, a decree constituting Latour d'Auvergne *First Grenadier of France.* He was killed at Oberhausen, in Bavaria, but his spirit lives to-day, and on ceremonial occasions his name is called from the muster-roll of his regiment (46th), the senior sergeant returning the thrilling response *mort au champ d'honneur.* His remains were carried to the Panthéon and interred, 4th Aug., 1889.

LA TRAPPE, a Cistercian abbey of Northern France, situated in a narrow valley of Normandy, 30 miles north-east of Alençon. Founded in 1140, it had become in the sixteenth century a haunt of licentious monks known as 'the bandits of La Trappe.' In the seventeenth century, however, the abbot Armand Jean le Bouthillier de Rancé instituted a vigorous reform, and caused the monks to adopt a life of severe asceticism. The austere Trappists passed their time in devotions, meditation, and labour, spoke no word to each other except the salutation of *Memento mori*, fed upon fruit and vegetables, and were entirely cut off from the world.

At the Revolution the Trappists were obliged to leave France, but afterwards returned, though expulsions took place again in 1880. They have a few houses in Germany, two in England, two in Ireland, and several in America. The Trappists wear a dark-coloured frock, cloak, and hood, which covers the whole face. Their discipline is much as before—they go to bed at seven or eight, rise at two, and maintain constant silence.

LATTER-DAY SAINTS. *See* MORMONS.

LATTICE-GIRDER, a girder, used

largely in bridge construction, in which the web is made up of mild-steel flat-bars or angle-irons riveted to the flanges and to each other, to form a system of diagonal bracing or lattice-work. Half of the bracings act as tension members and half as compression members. The girder rests on the pier at one end, and is provided with steel expansion rollers at the other. Other braced girders of similar character are the Warren, in which the web bracings take the form of equilateral triangles, and the Murphy-Whipple or Pratt, where they are in right-angled triangles.

LATTICE-LEAF, or **LATTICE-PLANT,** a very remarkable aquatic plant of Madagascar (*Ouvirandra fenestrālis*), by some referred to the nat. ord. Juncaginaceæ, by others to the Naiadaceæ, and noteworthy for the structure of its leaves. The blade resembles lattice-work or open needle-work, the longitudinal ribs being crossed by cross-bars, and the interstices between them open.

LATVIA, a European republic on the Baltic, bounded by Estonia, Russia, Lithuania, the Baltic Sea, and the Gulf of Riga. It consists of the former Russian province of Courland with parts of the former provinces of Livonia and Vitebsk; total area, 25,000 sq. miles (560 water). It is the national home of the Letts (q.v.), who form the major part of the population of (1930), 1,900,045. The capital is Riga; other towns are Liepaja (Libau), Daugavpils (Dvinsk), and Jelgava (Mitau). The surface is mainly flat and is well watered, the principal river being the Dvina.

Production and Industry. The chief industry is agriculture, and about 2,000,000 acres are under oats, rye, barley, flax, &c. Dairy- and sheep-farming are also important. Forests cover about 4,098,280 acres. There are match, paper, and timber-product industries. Minerals are unimportant.

Commerce and Communications. The total value of exports in 1932 was 96,515,000 lats, and of imports 84,731,000 lats. The chief exports were flax and timber, and went mainly to Britain, Belgium, and Germany. There were in 1932, 1,715 miles of railway track, and the chief ports, Riga, Liepaja, and Ventspils, have direct railway communication with Russia.

Religion, Education &c. The main religion is Protestantism (56·58 per cent.), but there are many Roman Catholics and Jews. Education is well provided for, and the Latvian University is at Riga. Military service is compulsory, and the standing army has a strength of 2,200 officers and 23,000 men. There are 550 men in t Air Force. There is a small coast defence naval force.

Constitution and History. Aft various vicissitudes Latvia was s signed to Russia in 1772 and 179 It was declared independent in 19 and joined the League of nations 1921. The country's boundaries we fixed and a period of steady progre began, with socialism as a stro force in political life. The Constitu tion (passed 1922) declared Latvia t be a democratic republic, the sovereig power being vested in the peopl The *Saeima* (Parliament) elects th President, who chooses the Premie There is a small Cabinet.

Currency. The currency unit is th gold lat, equal in value to the gol franc, containing ·2903 grammes o fine gold.—BIBLIOGRAPHY: *Statistica Annual of the Bureau of Statistics o the Latvian Republic*; A. Bilmans *Latvia in the Making*; K. Duzmans *Lettland*; Ian A. Ozolin, *Latvia in th Making*; M. Walters, *Lettland*.

LAUBAN, a town of Prussia, ir Silesia, on the Queiss. It has manu factures of woollen and linen clott and tobacco. There is a fourteenth-century convent of the Magdalens. Pop. 15,971.

LAUD, William, Archbishop of Canterbury, born at Reading 1573, and beheaded on Tower Hill, London, 10th Jan., 1645. He was the son of a clothier, and received an elementary education at Reading, matriculating at St. John's College, Oxford, in 1589, and subsequently winning a scholarship there. In 1593 he was admitted a Fellow of his college, and in 1608 became D.D. At St. John's he studied under John Buckeridge, an Elizabethan ecclesiastic reformer, whose teachings influenced him in after life.

Laud was chaplain to Neile, Bishop of Rochester, in 1608, and king's chaplain, accompanying James I to Scotland in 1617. On the accession of Charles I he was nominated Bishop of Bath and Wells, and was translated to London in 1628. In 1630 he was elected chancellor of the University of Oxford, which he enriched with a valuable collection of manuscripts, establishing also a professorship of Arabic, and, although he received two offers of a cardinal's hat, he eventually accepted the office of Archbishop of Canterbury, and was enthroned in 1633.

Prior to this appointment Laud's influence upon ecclesiastical matters in general had only been felt indirectly through his position upon the High Commission and in the Court of Star Chamber, but now he was enabled to adopt as an ideal the principles of

keridge, and he had no scruples in izing all his political and ecclesi- cal influence to root out Calvinism Roman Catholicism and establish Episcopacy.

Eventually he was impeached by Long Parliament (1640), and peared at the bar of the House of rds, being committed thereafter to Tower for high treason. After ee years he was brought to trial, t the House of Commons passed a ll of Attainder (4th Jan., 1645) de- ring him guilty of high treason, and ndemned him to death. Laud's *ary* was published by Wharton in 94.—BIBLIOGRAPHY: Peter Bayne, *ief Actors in the Puritan Revolu- m*; A. C. Benson, *Archbishop Laud: Study*; W. L. Mackintosh, *Life of illiam Laud*.

LAUDANUM, name given to tinc- re of opium. It is a dark reddish own liquid, standardized to contain 75 per cent. of anhydrous morphine, is prepared by steeping powdered pium in dilute alcohol for some time. fterwards straining, pressing and ltering the product. Laudanum is sed in prescribed doses as an ano- yne and soporific.

LAUDER, Sir Harry Maclennan, cots vocalist and character come- lian, born 1870 (Portobello); was uccessively mill-boy, miner, amateur ocalist, and eventually made a hit at he London Pavilion. He took the heatrical public by storm, toured the United States, and reached the top of his profession. During the Euro- pean War he raised a Million-pound Relief Fund, diffused Scottish patriot- ism in the United States by song and story, and was knighted in 1919. His book of war experiences, *A Minstrel in France*, was published in 1918, *Roamin' in the Gloaming* in 1928, and *Wee Drappies* in 1931.

LAUDERDALE, John Maitland, first Duke of, born at Lethington, in Scotland, 24th May, 1616, died 24th Aug., 1682. He entered public life as a zealous Presbyterian; was one of a Scottish deputation who waited on Charles I for the purpose of urging upon him the adoption of moderate views; sat in the Westminster Assem- bly of Divines in 1643; and not long afterwards was a party to the delivery of the king to the English army at Newcastle. Stricken by remorse, he became converted to the Royalist cause, and secretly undertook to raise a Royalist army, which he unsuc- cessfully sought the Prince of Wales, afterwards Charles II, to command.

When at last, in 1650, Charles II embarked for Scotland, he was accom- panied by Lauderdale, who was taken prisoner at the battle of Worcester (1651), and was not set at liberty till the Restoration in 1660, when he joined the king at Breda, and was made Secretary of State for Scotland. His power he used with unscrupulous rigour in his efforts to force Episcopacy upon his former Presbyterian friends. As a reward for his zeal and sub- serviency he was created Duke of Lauderdale and Marquess of March (1672), and raised to the English peerage as Earl of Guildford and Baron Petersham (1674), being after- wards one of the junta known as the Cabal.

As a result of the tyrannical con- duct which made his name the most hated and feared in all Scotland, an address was presented to the House of Commons praying that he might be removed from all his offices. Charles was forced eventually to remove him, and his resignation was accepted in Oct., 1680. In Aug., 1682, Lauderdale died and the dukedom became extinct. A selection from his manuscripts was edited by Osmond Airy, in four volumes, 1883–5.

LAUDS, service in the Roman Catholic Church. In the early church it was sung at daybreak. To-day it is sometimes said after matins. The Psalms 148, 149 and 150 are called the "lauds," or psalms of praise, and from these the service received its name.

LAUGHING-GAS, NITROUS OXIDE, or **NITROGEN MONOXIDE,** N_2O; called *laughing-gas* because when inhaled in small quantity it causes hysterical laughter. It is a colourless gas with slightly sweet odour, and resembles oxygen in some of its properties. Its physical con- stants are almost identical with those of carbon dioxide, a fact of some interest in connection with Lang- muir's theory of molecular structure. The substance is prepared by heating ammonium nitrate, which decom- poses readily, yielding nitrous oxide, $NH_4NO_3 = N_2O + 2H_2O$. Nitrous oxide, the 'gas' of the dentist, acts as an anæsthetic, either when inhaled pure or mixed with one volume of oxygen, and is used in minor opera- tions. If the gas is to be used for this purpose, it is carefully purified from other oxides of nitrogen, dried, and liquefied by pressure and cooling, and stored in iron bottles.

LAUGHING JACKASS, or **GIANT KINGFISHER** (*Dacĕlo gigas*), a bird allied to the kingfisher, deriving its former title from the singularly strange character of its cry. It is an inhabitant of Australia, being found chiefly in the south-eastern portion of that country. It makes no nest, but deposits its eggs in the decayed

hollow of a gum tree. In length about 18 inches, it has a dark-brown crest, its back and upper surface is olive-brown, wings brown-black, and the breast and under portions white, crossed by faint bars of pale brown. The tail is longish, with a rounded extremity, tipped with white; its colour is a rich chestnut, with deep black bars.

LAUGHTER. Among the philosophers who have endeavoured to explain the causes of laughter are Aristotle (*De Poetica*), Cicero (*De Oratore*), Hobbes (*Human Nature*), who defines the cause of laughter "to be a sudden glory, arising from a sudden conception of some eminency in ourselves by comparison with the infirmity of others," Shaftesbury, Darwin,

Laughing Jackass

Spencer, Bergson, and others. Bergson thinks that mirth is the result of a contrast between the stiffness of a mechanism and the suppleness of life. We laugh at a man who slips and falls, because in falling he obeys mechanical laws, whilst we expect him to be agile enough to keep his feet. Some authorities are of opinion that 'disappointed expectation' is enough to provoke laughter.—BIBLIOGRAPHY: Herbert Spencer, *The Physiology of Laughter* (Essays: Scientific, Political, and Speculative); James Sully, *An Essay on Laughter*; H. L. Bergson, *Laughter*; L. Dugas, *Psychologie du rire.*

LAUNCE, a name common to two species of fishes, otherwise called sand-eels. They have their name from their lance-like form. *See* SAND-EEL.

LAUNCESTON, borough and market town of Cornwall. It stands where the Kensey falls into the Tamar, 212 miles from London, on the Gt. Western and Southern Rlys. The chief objects of interest are the ca keep, the property of the Duch Cornwall, and the ruins of an prison and Norman gateway. borough includes Newton on other side of the Kensey, once separate town. The town is chie a centre for the sale of agricultu produce. Pop. (1931), 4,071.

LAUNCESTON, the second town Tasmania, by rail 120 miles north Hobart, at the confluence of the No and South Esk Rivers with the Tam which is navigable up to the to from the sea at Port Dalrymple, distance of 40 miles. Pop. (193 31,210.

LAUNDRY, establishment whe washing and dressing of soiled lin and clothes is carried on. Laund work is now done mostly by mecha ical means. Rotary washing machin are used. These consist of a pe forated cylindrical cage for th reception of the soiled linen, enclose in an outer casing containing th soapy water. Hydro-extractors a used for the removal of water and th final drying is effected by dry a treatment, while ironing is carrie out by gas or steam-heated rollers.

In Great Britain laundries ar inspected by public health officials and there are legal provisions abou the hours of employment and th workers' conditions.

LAURA'CEÆ, the laurel family, natural order of apetalous dicotyle dons, consisting entirely of trees an shrubs inhabiting the warmer parts o the world, and in most cases aromatic Cinnamon, cassia, sassafras, and camphor are products of the order. The best-known species is the *Laurus nobilis*, laurel or sweet-bay.

LAU'REATE, POET, a designation first applied to poets who were honoured by the gift of a laurel wreath. It is now the name of an official nominally connected with the royal household of Great Britain, appointed by patent, first granted by Charles II in 1670.

The appellation is derived from Lat. *laurus*, a laurel, in allusion to the ancient practice of crowning poets with a laurel wreath. The custom, which existed among the Greeks, was revived in the Middle Ages, and Petrarch was crowned at Rome in 1341. At the Universities of Paris, Oxford, and Cambridge distinguished graduates were presented with a laurel wreath, and were in consequence styled *Poetæ Laureatæ*. The royal Laureate was merely one of these in the king's service. They were, however, not crowned, and instead of this honour they received pensions. Such stipendiary royal poets were

ucer, Gower, Skelton, Robert ittington, Spenser, and Samuel niel. Ben Jonson, who received a sion in 1616 and 1630, came to be arded as Laureate, but the title, it seems, was never officially con-ed on him. The first English poet o received the title of Poet Laureate royal letters patent was John yden, on 18th Aug., 1670.

At one time the Laureate used to nish an ode on the birthday of the ig or upon the occasion of a national tory, the emoluments of the office ing £100 a year with a tierce of nary. Since the reign of George III ere have been no special duties con-cted with the office, which now has yearly allowance of £72 attached to

From the time of Charles II the llowing poets have held the office Laureate: John Dryden, Thomas adwell, Nahum Tate, Nicholas owe, Lawrence Eusden, Colley bber, William Whitehead, Thomas arton, Henry James Pye, Robert outhey, William Wordsworth, Lord ennyson, Alfred Austen, Robert ridges, and John Masefield.—Cf. W. . Gray, *The Poets Laureate of ngland*.

LAUREL, a plant belonging to the enus Laurus, nat. ord. Lauraceæ, to hich it gives the name. The sweet-ay or laurel (*Laurus nobilis*) is a ative of the north of Africa and outh of Europe, and is cultivated in ardens not only on account of its raceful appearance, but also for the romatic fragrance of its evergreen eaves. The fruit, which is of a purple olour, and also the leaves, have long been used in medicine as stimulants nd carminatives.

The common or cherry laurel is *Cerăsus laurocerăsus*, the Portugal aurel *Cerăsus lusitanica*, the spurge-aurel *Daphne Laureŏla*, but these are very different from the true laurel. In ancient times heroes and scholars were crowned with wreaths of bay leaves, whence the terms *laurels* in sense of honours (and similarly *bays*,) and *laureate*.

From the fruit of the sweet-bay or laurel several oily substances have been extracted. Thus there is the *oil of laurel*, a yellowish oil with an odour of laurel and a strong bitter taste; *laurel fat*, a yellowish-green buttery substance, used for embrocations in rheumatism, paralysis, deafness, &c. Water distilled from the leaves of the cherry-laurel (*laurel-water*) contains prussic acid, and is used medicinally.

LAURENTIAN, in geology, a term applied to a vast and very ancient series of stratified and crystalline rocks, including gneiss, mica-schist, quartzite, serpentine, and limestone, found in the Laurentian Plateau of Canada. The granites and gneisses originally styled Laurentian are now known to be intrusive in rocks of still earlier date, and the name is likely to fall into disuse; the term *Archœan* is now generally given to the older members of the pre-Cambrian group, and by many authors to the whole group. *See* GEOLOGY.

LAURENTIAN PLATEAU, a great physiographical region in Canada, comprising an old mountain mass, considerably affected by weathering, and now about 1,500 feet in mean elevation. It extends as a vast sweeping crescent round Hudson Bay.

LAURIE, Annie, Scottish heroine. She was a daughter of Sir Robert Laurie, a landowner of Maxwellton, Dumfriesshire, and was born in 1682. On her marriage in 1717 an unsuccessful suitor, William Douglas, wrote the song which has made her name immortal. The music was composed by Lady John Scott, who added a verse to the song.

LAURIER, Sir Wilfrid, Canadian statesman, born of French Roman Catholic parents at St. Lin, Quebec, 20th Nov., 1841, died at Ottawa 17th Feb., 1919. Educated at M'Gill University, Montreal, he was called to the Bar in 1864, and seven years later entered the Provincial Assembly. In 1874 he became a member of the Federal Assembly, in 1877 Minister of Inland Revenue, and in 1891 leader of the Liberal party. In 1896 he became Premier of Canada, being the first French-Canadian or Roman Catholic to hold that post. He represented Canada at the Colonial Trade Conference in London in 1902, and at Imperial Conferences in 1907 and 1911. In this year his Government advocated a measure of trade reciprocity with the United States, but was defeated, and resigned office. He was made a Privy Councillor in 1897, and a G.C.M.G.

LAURIUM, mountain in Greece. It is about 30 miles south-east of Athens and was celebrated in ancient times for its silver mines. They belonged to Athens and from them the city obtained much wealth. Within recent years mining has been revived in the district and considerable quantities of silver and lead, as well as cadmium, manganese and iron, are produced.

LAU'RUSTINE, or **LAURUSTI'NUS** (*Viburnum tinus*), a favourite evergreen shrub belonging to the south of Europe, and grown in Britain. Its flowering season is from December to April.

LAURVIK, a seaport town and spa of Norway, on a small fjord entering from the Skagerrak, at the mouth of the Lauven, 67 miles S.S.W. of Christiania. Pop. (1930), 10,471.

LAUSANNE, a town of Switzerland, capital of the canton of Vaud, and a noted tourist centre. It is built on three hills, and is divided into two parts by the Flon Valley. A bridge, the *Grand Pont,* spans this valley and links up the *Cité* on one side with the *Bourg* on the other. The town is overshadowed by its cathedral (Notre Dame), which dates from 1235, a Gothic erection last restored in 1906. A university has occupied the Palace de Rumine since 1906. It has a broadcasting station (680 M., 0·6 kw.). Pop. (1930), 75,915.

LAUSANNE, TREATY OF, a treaty signed at Lausanne in 1923 in place of the abortive Treaty of Sèvres (1920). The main signatories were Britain, France, Italy, Japan, Turkey, and Greece, and its chief purpose was the settlement of Turkish affairs and the adjustment of Turco-Greek difficulties. By it Turkey retained Eastern Thrace, ceded Syria, Palestine, Mesopotamia, and the rest of Arabia, and gave up all claims to Cyprus and Crete; Italy retained the Dodecanese; Greece got all the Turkish Ægean Islands; and certain areas in S.E. Europe were demilitarized, particularly around the Dardanelles and on the European borders of Turkey.

LAVA, a general term for all rock-matter that flows, or has flowed, in a molten state from volcanoes, and which, when cooled down, forms varieties of igneous rock, the structure of which is influenced by slowness or rapidity of cooling, while the minerals that separate out depend mainly on the chemical composition of the mass (*see* IGNEOUS ROCKS). Lavas are often scoriaceous, through the escape of gases from the viscous mass. A *contemporaneous lava bed* is one which has been poured out over the surface of one deposit, and covered by subsequent deposits. The portion of the lava that has cooled in the volcanic vent, or in a dyke, without reaching the surface must be classed as *intrusive,* and connects the flows with the material that occupies the subterranean cauldrons.

LAVAL, Pierre. French statesman. Born in 1883, he became a socialist. In 1908 he was mayor of Aubervilliers and a little later he was elected to the Chamber of Deputies. He was made a senator in 1924, and in 1925 was Minister of Public Works. In 1926 he was Vice-President of the Council under M. Briand, and in 1930 Minister of Labour under M. Tardieu. In Jan., 1931, he became Premier and Mini of the Interior, and it was his lo deal with the difficulties about payment of reparations that aros 1932. In Jan. 1932, he reconstruc his ministry, but a little later he forced to resign.

LAVAL, a city of France, capita Mayenne, on the River Mayenne. linen industry was introduced i Laval in the fourteenth centu Flannel, paper, leather, dye-stuffs, & are also manufactured. Pop. 27,7

LAVALLEJA, a southern inla department of Uruguay, devoted grain and stock-raising. Area, 4,8 sq. miles; pop (1932), 103,228.

LAVA'TER, Johann Kaspar, ce brated as a physiognomist, was bc 1741 at Zürich, in Switzerland, a died 1801. He first appealed to t public as a poet in 1767, and then b came pastor of a Zürich church (177 Lavater is best known, however, the originator of a system whic when applied to the lines and contou of the face, he claimed to be able read the character of its owner. H adopted the idea in 1769, and pu lished his great work under the title *Physiognomical Fragments* (4 vol 1775–8).

LAVAUR (lå-vôr), a town of Franc department of Tarn, 23 miles soutl west of Albi. Its castle was stormed i 1211 by Simon de Montfort, and th refugee Albigenses were massacrec Pop. 6,590. *See* ALBIGENSES.

LAVELEYE (lâv-lā), **Émile Lou Victor, Baron de,** a Belgian politica economist, born 1822, died in 189 He was educated at Bruges and Paris published his first work in 1847, an became professor of economics at th University of Liége in 1864. He pub lished many works on the science o economics, of which we may mention *Étude d'économie rurale* (1864), *Élé ments d'économie politique* (1882), and *Le Socialisme contemporain.*

LAV'ENDER (*Lavandŭla vera*), a delightfully fragrant shrub 3 to 4 feet high, nat. ord, Labiatæ, a native of the south of Europe. Under favourable conditions it contains one-fourth of its own weight in camphor. It also produces a volatile oil, which is much in demand as an excellent perfume. This oil is got by distilling the flowers. It has a pale-yellow colour, aromatic odour, and a hot taste. Besides being employed as a perfume, it is used in medicine as a stimulant in hysteria, colic, and other ailments.

Spirit of Lavender is prepared by digesting the fresh flowers in rectified spirits and distilling. **Lavender-water** is a solution of oil of lavender in spirit along with otto of roses, bergamot,

ık, cloves, rosemary, &c. This paration, after standing for some e, is strained and mixed with a ain proportion of distilled water.

LAVENHAM, town of Suffolk. It 0 miles from Bury St. Edmunds, the L.N.E. Rly. There is a guild- l dating from the 16th century, and of the finest churches in the nty. At one time Lavenham was a rishing market town and a centre he cloth manufacture. Pop. 2,000.

LAVER, a name given to two ecies of Algæ of the genus Por- yra—*P. laciniata* and *P. vulgāris.* ey are employed as food, salted, en with pepper, vinegar, and oil; d are said to be useful in scrofulous ubles and glandular tumours.—**een Laver** is the *Ulva latissima.* It so is employed as food, stewed and asoned with lemon-juice, and is dered for scrofulous patients.

LAVERSTOKE, village of Hamp- ire. It stands on the Test, 2 miles om Whitchurch, and contains the aper mills at which, since 1724, the aper for English bank notes has been ade. They are owned by the family Portal whose residence is **Laver- oke House.**

LAVERY, Sir John, Irish artist. orn in Belfast in March, 1856, he tudied art in Glasgow and then in ondon and Paris, and became a elebrated portrait painter. In 1912 e was created A.R.A., and in 1921 .A. He was knighted in 1918. His ork may be seen in the National ortrait Gallery, London, in the ollections in Glasgow, Liverpool, Manchester and at Ottawa and else- where abroad. Since 1932 he has been President of the Royal Society of Portrait Painters.

LAVOISIER (lȧ-vwä-si-ā), **Antoine Laurent,** French chemist, was born at Paris 26th Aug., 1743, died 1794. He was educated at the College Mazarin, studying mathematics and astronomy under Lacaille. He published several treatises, travelled through France collecting material for a geological chart, became an associate of the Academy in 1768, and obtained the post of Farmer-General of Taxes in 1769. His wealth and position enabled him to extend his researches, and the new discoveries of Priestley, Black, and Cavendish gave impetus and direction to his studies.

In 1790 he sat on the Commission of Weights and Measures, and in 1791 became Commissary to the Treasury. In 1794 Lavoisier was accused before the Convention as an ex-Farmer-General and guillotined. He was the first to organize the methods of chemistry and establish its terminology. His most important discoveries are to be found in his *Traité de Chimie* and *Mémoires de Physique et de Chimie.*—BIBLIOGRAPHY: E. Grimaux, *Lavoisier d'après sa correspondence, ses manuscrits, ses papiers de famille et d'autres documents inédits*; M. P. E. Berthelot, *La Révolution chimique: Lavoisier,* &c.

LAVONGAI, modern name of New Hanover (q.v.).

LAW, Andrew Bonar, British politician and party leader, was born in 1858 in New Brunswick, the son of a Presbyterian clergyman. Educated in Canada, Hamilton, and at Glasgow High School, he entered the iron trade, and was in business until 1900, when he entered the House of Commons as Unionist member for Blackfriars, Glasgow. In 1902 he was Parliamentary Secretary to the Board of Trade, but lost his seat to G. N. Barnes (Labour) in 1906. He was subsequently returned for Dulwich, and, on resigning his seat to contest North-West Manchester, where he was defeated (1910), he successfully contested Bootle, Lancashire, in 1911.

On the resignation of Mr. A. J. Balfour he became Leader of the Opposition until 1915, when he was appointed Colonial Secretary. On the resignation of Mr. Asquith in 1916, Bonar Law declined to form a Cabinet, and joined Mr. Lloyd George as a Coalition Unionist. He accepted office under the Coalition, and was both Chancellor of the Exchequer and Leader of the House of Commons, until 1918.

He sat in the War Cabinet from 1916 until 1919, and in the general election of 1918 he was returned as Coalition Unionist for the Central Division, Glasgow, and appointed Lord Privy Seal and Leader of the House. He was British Plentipotentiary at the Versailles Conference. He was Prime Minister from Oct., 1922, to May, 1923. He died on 30th Oct., 1923.

LAW, John, of Lauriston, a celebrated Scottish financier, son of a goldsmith of Edinburgh, born 1671, died at Venice 1729. He was bred to no profession, but being skilled in accounts he made various proposals to the Scottish Parliament to remedy the currency, which were rejected. Subsequently he fled from his country in consequence of a duel; visited Genoa and Venice, where he accumulated a fortune by gambling; settled in France, where he received royal patronage, and there started a private bank, and floated his celebrated Mississippi Company.

His immediate success was so great that he was made a Councillor of

State and Comptroller-General, but the large amount of paper money issued depreciated the shares, and led to the collapse of his schemes. Having had to flee from France, he wandered about Europe as a gambler, and died at Venice in poverty. A volume entitled *Œuvres de J. Law* was published at Paris in 1790, and reprinted in 1843.—Cf. A. W. Wiston-Glynn, *John Law of Lauriston.*

LAW, CONSTITUTIONAL. The province of Constitutional Law, stated in general terms, is to define the powers and functions of the several bodies entrusted by a State with the making of laws, the enforcement of laws, and the interpretation of laws, to regulate the relations of these several organs to one another, to the machinery of local government, and to the individual subjects of the State.

It determines such matters as succession to the throne; the royal prerogatives; the qualification for membership, privileges, and powers of the Houses of Parliament; the function of ministers; the organization of the administrative departments, and of the courts of justice; the jurisdictions of these courts, original or appellate; the powers of local governing bodies; the relations between the mother country and its dominions and colonies; the rights of the State against its subjects; and the protection and remedies which the subjects may claim from the State, in the exercise of private rights of person and property.

The Constitution of a State thus consists of two parts: (*a*) the institutions which exercise the three chief functions of government, legislative, executive, and judicial; and (*b*) the rules or laws which regulate the mode in which each of these should exercise its powers, independently, in relation to the other organs of government, and to the individual subjects. These relations and rules may definitely be laid down in a written document as in the case of the United States and France, and (within limits) the British self-governing dominions, e.g. Australia and Canada.

In Great Britain the Constitution has not been so reduced to a code, but has come into being piecemeal so as to meet practical necessities as they arose. The rights of individuals in this country are not as in some Continental countries explicitly guaranteed, but have been established gradually as the result of judicial decisions in particular cases. The constitutional law of our country is thus heterogeneous in character, consisting in part of statutes like Magna Charta, 1215, the Bill of Rights, 1689, and the Parliament Act, 1911, partly of customary law, and partly of judicial precedents.

Alongside of these constitutional laws have grown up a number of conventions or understandings which have not the force of laws but which are an integral and vital part of our Constitution, giving to it much of its distinctive character. These conventions regulate such matters as the position and formation of a Cabinet, the occasions when it is proper that a Ministry should retire, the precise political functions of the Crown, and similar constitutional requirements. These "unwritten laws" obviously discharge a very useful function in reconciling the conflicts between different parts of the constitutional machinery in circumstances which would hardly come within the scope of or be regulated by proper laws.

The relations between the legislature and executive and the judiciary are different under different constitutions, but in England the legislature is the ultimate source of power in the State. Parliament (consisting of King, Lords, and Commons) has absolute legal sovereignty, in virtue of which it alone may pass, alter, or repeal any law. Parliament is superior to the judiciary, which cannot by any decision overturn but can only interpret and apply the law as declared by Parliament. Parliament has also control over the executive, for ministers are accountable to the legislature and can only continue in office so long as they command the confidence of the legislature.

In these respects the British Parliament offers a strong contrast to Congress in the United States. In the United States the relations of legislature, executive, and judiciary are regulated by the principle of the 'separation of powers.' Congress has no control over the ministry, which can continue in office for its appointed term whether it enjoys the confidence of the legislature or not.

Further, Congress does not possess legislative sovereignty; the scope of the measures it may pass is strictly defined in the Constitution, and any statutes contrary to the fundamentals of the Constitution may be overturned as null and void by the Supreme Court of Judicature. The judiciary is thus placed in an independent and paramount position so as to safeguard the written Constitution from innovation and change. The doctrine of the separation of powers may thus develop considerable friction between the different organs of government, while the rigidity of the written Constitution, changeable not by the legislature but only by a cumbrous

machinery, may prevent or at least retard reforms which are approved by the people. The Constitution itself is subject to amendment by a complicated procedure requiring the co-operation of the Federal authorities with the State Legislatures.

In Britain, however, by means of the Cabinet system, a device which has imperceptibly and without enactment come into being, a link has been created between the executive and the legislature, for the members of the Cabinet are at once the king's ministers and members of either House of Parliament, being selected from the party which commands a majority in the House of Commons. The electorate thus exercise through their representatives in Parliament a control over the policy of the ministry and over the programme of legislative measures which the ministry introduce into Parliament.

Again, because of the absence of that rigidity which is inevitable in a written Constitution, the British Constitution is more responsive to the demand of the electorate for change and reform. No special machinery requires to be set in motion, no fundamental law forbids legislation in any special direction, only the demands of the electorate need be considered. Parliament can make and it can also unmake any law. It is for the time being invested with omnipotence, unrestricted by the provisions of previous statutes or by the most firmly established rules of common law, unfettered by judicial precedents or the will of the executive.

Another feature of our Constitution is described by Professor Dicey as the Rule of Law. The same law applies to all alike. There are thus no legal privileges enjoyed by any social class, and only very limited immunities extended to officers. In some countries there are special rules which apply only to officials, and special administrative tribunals, with a more or less official composition, decide questions in which officials are involved. But with us all officials, military and civil, are amenable for their actions to the ordinary courts and the ordinary law, and in a question with a civilian who has suffered injury are answerable both civilly and criminally. They cannot plead reasons of State or the commands of a superior as justification for committing a wrong.

Respect for individual freedom and private rights is thus the basic principle of our Constitution, which is prolific in its provision of remedies for the infringement and invasion of the right of the subject to freedom of speech, the exercise of his calling, the use of his property and his personal liberty.

LAW, COURTS OF. Justice in England is administered by a series of courts, central and local, all graded with reference to the importance of the classes of cases with which they deal.

Central Courts. The historic Courts of Common Law, viz. Common Pleas, King's Bench, and Exchequer, all arose by a process of devolution from the *Curia Regis* or King's Court. To begin with, the *Curia Regis* of the Norman kings was concerned with matters directly affecting the royal interests and the determination of disputes between the greater subjects. For the great mass of the people justice was administered and law enforced by means of the old popular courts of *shire* and *hundred* which had existed in England prior to the Norman Conquest, and in the baronial courts of the feudal overlords.

The popular and feudal courts were only gradually brought into relation with the royal courts. Step by step the King acquired an effective supervision of the local courts which was achieved by the appointment in each shire of a royal representative known as the *sheriff*, and by the practice of sending out from his *Curia Regis* itinerant justices who made periodical circuits of the shires, and by the writ system which enabled the royal courts to take cognizance of suits which were pending or had hitherto usually been brought before the local courts.

By these means royal justice became co-extensive with national justice, and the royal courts, instead of being primarily reserved for the decision of matters affecting the king and his greater subjects, was now made available to all subjects as a court of first instance or by way of appeal. The increased competency of the *Curia Regis*, and the increasing mass and varied character of the business with which it was called upon to deal, necessitated in time a systematic division of its work into departments, and the devolution of particular classes of cases on separate bodies of judges.

Hence arose ultimately a series of distinct courts, all offshoots from the parent body of the *Curia Regis*, and all having theoretically at least a more or less prescribed sphere of jurisdiction. The first of these courts to become definitely marked off was the Court of Common Pleas, which may be traced to the reign of Henry II, and the province of which was to decide between subject and subject in cases where the royal interests were not directly affected. Finally

there existed side by side three such courts:

1. Court of Exchequer, dealing with fiscal matters.

2. Court of Common Pleas, deciding disputes between subject and subject.

3. Court of King's Bench, dealing with pleas of the Crown, including crimes which had now come to be conceived of as an injury to the State and not merely as in primitive times to the individual affected.

These courts of justice dispensed *Common Law*, which came to be highly technical, narrow, and stereotyped in its procedure. In many cases its provisions pressed harshly on litigants, or failed to provide a remedy, and so petitions were frequently made to the King to mitigate the harshness or supply the deficiencies of the Common Law. These petitions were generally referred to the Chancellor, the 'keeper of the king's conscience.' Hence grew up a new court, the Court of Chancery, dispensing justice according to rules of equity, a system compounded of notions of moral right and common sense, and claiming to override in particular cases the rigid technical rules of the Common Law.

The history of English law for centuries is in great measure the history of the conflict of the three Courts of Common Law, each seeking by means of legal fictions to increase its jurisdiction and to attract business at the expense of the others; and of the resistance of the Courts of Common Law as a whole to similar encroachments on the part of the Court of Chancery. Thus the Exchequer, by means of the Writ *Quominus*, enabled a plaintiff in a suit between subject and subject to make a fictitious averment that he was the 'king's debtor,' and was prevented from paying the King because of the defendant's default.

Again the Court of King's Bench, which had an original jurisdiction in trespass *vi et armis* in Middlesex, similarly poached on the sphere of Common Pleas by the issue of the Writ *Latitat*, which enabled a plaintiff, by a fictitious averment that the defendant had committed such a trespass, to bring a civil action of debt in the King's Bench. Again, by means of injunctions and subpœnas, the Court of Chancery could stay proceedings or nullify the effects of judgment in the Courts of Common Law. Thus it came about that the three Courts of Common Law, King's Bench, Exchequer, and Common Pleas, originally distinct, came to exercise a virtually concurrent jurisdiction where Common Law gave adequate relief.

This state of matters, which g rise to many anomalies and abu only came to an end with the Judi ture Act of 1873. This Act, amended by the Act of 1875, p duced far-reaching reforms of mach ery and procedure, and at the sa time, if it did not 'fuse law a equity,' did much to remove t difference between the two syste and the inconvenience to litigants.

The eight superior courts of recc —King's Bench, Common Pleas, E chequer, Chancery, Probate, Divor Admiralty, and Bankruptcy—we merged into one great court called t Supreme Court of Judicature, whi has two branches, (1) the High Cou of Justice, which is a court of fir instance as well as a Court of Appe from inferior courts, and (2) the Cou of Appeal, which is a court of inte mediate appeal, there being a fin appeal from its decisions to the Hou of Lords. Appeals from the Dom nions courts on Constitutional matte lie to the Judicial committee of th Privy Council.

The *High Court of Justice* has no three Divisions:

1. The *King's Bench Division* (in corporating since 1881 the olde Divisions of King's Bench, Commo Pleas, and Exchequer), presided ove by the Lord Chief Justice of England It is from the King's Bench Divisio that the judges of assize who go o circuit are chosen, and their sitting are deemed to be sittings of the High Court of Justice. From the King's Bench Division also are selected the judges of the Court of Criminal Appea created by the Criminal Appeal Act o 1907.

2. The *Chancery Division*, presided over by the Lord Chancellor.

3. The *Probate, Divorce*, and *Admiralty Division*.

Every judge can act in any division, but in practice special classes of work are assigned to special divisions. Again, to prevent arrears and congestion, work may be transferred from one division to another. Further, in every cause commenced in the High Court, both law and equity are administered so that both plaintiff and defendant get the benefit of any relief to which they would have been entitled formerly in the Courts of Chancery.

Local Courts. The *County Courts* were established in 1846, and since then the duties of county court judges have been progressively increased. They have jurisdiction in ordinary cases up to £100 in suits for administration of estates of deceased persons, execution of trusts, for the redemption of mortgages and other cases of an equitable kind up to the value of

£500, and in winding up companies when the capital is under £10,000.

Cases, however, which involve sums beyond these limits are sometimes remitted to the county court judges for decision, and, where both parties consent, any Common Law action may be taken in the County Court. They have exclusive jurisdiction in cases under the Employers' Liability and Workmen's Compensation Acts. There is an appeal from the county court judge to the High Court.

Magistrates. A justice sitting alone may hear a case prior to commitment for trial, and has power to grant bail or discharge an accused person if the evidence is, *prima facie*, insufficient.

In the Petty Sessions, consisting of two or more justices, minor offences are dealt with; this court has also civil jurisdiction in judicial separations and maintenance orders.

Quarter Sessions, which sit once a quarter in counties and in some boroughs (where the Recorder is the judge), have competence to try with a jury all indictable offences except treason, murder, and certain grave crimes. They also act as a Court of Appeal from the decisions of Petty Sessions, and their judgments as courts of first instance are in turn appealable to the Court of Criminal Appeal. A Stipendiary Magistrate (who, unlike the Justice, is a paid official) may be appointed in boroughs on a petition to the Home Secretary.

Scotland. The supreme court in civil cases in Scotland is the Court of Session, which was instituted in 1532 by an Act of the Scots Parliament to exercise judicial functions which had hitherto been discharged by a committee of Parliament. The court at first consisted of a Lord President with seven spiritual and seven temporal Lords of Session, and sat as one tribunal till 1808, when it was divided into two separate courts, known as *Divisions*, with co-ordinate jurisdiction, the First Division presided over by the Lord President, the Second Division by the Lord Justice Clerk.

A further reorganization took place in 1818, when five Lords Ordinary were constituted into an Outer House subordinate to the Inner House with its two Divisions. The Outer House is a court of first instance, and the judgments of any Lord Ordinary may be reviewed by the Inner House, and appeal may be taken from the latter to the House of Lords.

The High Court of Justiciary is the supreme court in criminal cases in Scotland. It superseded the old jurisdiction of the King's Justiciar, who till 1587 had heard pleas of the Crown in his 'justice ayres' or circuits throughout the country. The court was presided over by the Lord Justice General (an office now combined with that of Lord President of the Court of Session), and in his absence the court is presided over by the Lord Justice clerk, who since 1808 is also President of the Second Division.

The Lord Advocate, the Solicitor General, and four Advocates Depute act as Crown prosecutors in the Court of Justiciary, prosecutions at the instance of a private party, though competent, being virtually obsolete. Trials are always conducted with the aid of juries, which consist of fifteen, who, in addition to the two verdicts possible in England, *guilty* and *not guilty*, may return a verdict of *not proven*. There is no appeal from a decision of the Court of Justiciary, but it can review the decisions of all inferior criminal courts.

By the Summary Jurisdiction (Scotland) Act it is competent to bring sentences imposed in the Sheriff Courts under review of the High Court of Justiciary by means of *stated case*. The Sheriff Courts have civil and criminal jurisdiction in the various shires. In questions affecting movable rights, their jurisdiction is unlimited, and they have also jurisdiction in actions of damages (which may be removed to the Court of Session), in maritime cases, and in questions regarding heritable subjects situated within the shire. They have no competence, however, to deal directly with questions of status—marriage, divorce, &c.

Every person convicted on indictment since the 31st October, 1926, has had a right of appeal against conviction or sentences or both on a question of law or fact or mixed law and fact to the High Court of Justiciary. The law was further amended in 1927 by a provision that the Secretary for Scotland may refer a case to the High Court of Justiciary although the person concerned was convicted before 31st October, 1926. This court, however, differs from the Court of Criminal Appeal in England in that its decisions are final, whereas in England a case can be carried to the House of Lords.

LAWBURROWS, LETTERS OF, in Scots law, a writ or document in the name of the sovereign, commanding a person to give security against offering violence to another. The person applying for the letters must swear to the truth of some cause of alarm, such as actual violence or threats of violence.

LAWES, Sir John Bennet. English scientist. Born at Rothamsted, 28th Dec., 1814, he went to Eton and Brasenose College, Oxford. In 1822 he

inherited his father's estate at Rothamsted and there, on leaving Oxford, he began experimenting with the growing of crops. The results were of high value to agriculture, and in 1899 the work was handed over to a trust he created, **The Lawes Agricultural Trust,** which still conducts it. He became F.R.S. in 1854, and in 1882 was created a baronet. Lawes died 31st Aug., 1900.

LAWN TENNIS, popular outdoor game played by both sexes. The implements are racquets and balls, and it is played on a court 78 feet long and 36 feet wide. The court is divided into two equal parts by a net and further into sections by white lines, and the aim of the players is to hit the ball so that it falls within the court, but at such a pace, or in such a position, that it cannot be returned. A failure to return the ball counts a point to the other side. The score goes 15, 30, 40, 50, so that four points can make a game. If, however, both sides reach 40, or deuce, the game is continued until one side is two points ahead of the other. The side that wins six games scores a set, but here again if the sides reach 5 games each, the set cannot end until one side is two games in front. Sets of 12-10, or thereabouts, are quite usual.

The game is usually played by two persons against two, but it can be played by one against one. In this case the court is less broad, a portion at each side, 4 feet 6 inches wide, being now outside it. Grass courts are the more common, but of late years many hard courts of gravel, cement or asphalt have been laid down. On these the game can be played throughout most of the winter. There are regulations about the weight and size of the balls, but none about the racquets.

There are tennis clubs all over Great Britain and Ireland; also in the United States, Canada, France, Japan and other countries. The great event of the lawn tennis year is the international meeting at Wimbledon, where players from all over the world meet to decide the various championships. Since the Great War American players have often been successful in the men's games, although France has won a number of victories. Among the women the outstanding player has been Suzanne Lenglen. In the early days of the championship matches, which began in 1877, players from Ireland were the most notable exponents of the game.

The game in Great Britain is governed by the Lawn Tennis Association which was formed in 1888. Its address is 28 Essex Street, London, W.C.2. Professionals are recognized for coaching and other purposes, but ar strictly debarred from matches an competitions.

The Davis Cup is contended for by male teams from the various countries In 1933 it was won by Britain, after having been abroad for 20 years. The Wightman Cup is fought out between woman players from Great Britain and the United States.

The game developed from real tennis and was at first called sphairistike (q.v.). It was played in 1874 and soon took its modern form. Names of great players include the Irish brothers Renshaw and Doherty, Borotra and Cochet, and the Americans Tilden and Ellsworth Vines, who won the singles championship in 1932, and Jack Crawford, winner of the singles championship at Wimbledon in 1933. Famous women players include Suzanne Lenglen and Mrs. Helen Wills Moody.

LAWRENCE, Arabella Susan, English politician. Born in 1871, she was educated at Newnham College, Cambridge, and began to work among the poor in London. In 1912 she became a member of the London County Council, and she kept her seat until 1928. In 1923 she was chosen Labour M.P. for East Ham, North, and represented that constituency again 1924–31, when she was beaten. In 1929–31 she was Parliamentary Secretary to the Ministry of Labour, and held several important posts in the Labour movement, including organizer of the National Federation of Women Workers and deputy chairman of the Labour Party.

LAWRENCE, David Herbert, English writer. Born at Eastwood, 11th Sept., 1885, the son of a coal-miner, he was educated in Nottingham. In 1911 he published his first novel, *The White Peacock,* and in 1913 he made his name with *Sons and Lovers,* a realistic story of life among the coalminers. Henceforward his life, passed partly in Mexico and partly in Italy, was occupied with literature and art. His other novels include *The Trespasser, The Lost Girl, The Plumed Serpent, Kangaroo, The Ladybird,* and *The Prussian Officer,* a volume of stories. *The Rainbow* was suppressed and *Lady Chatterley's Lover* was printed abroad. He wrote a good deal of verse, including a volume called *Pansies,* some essays and some plays. He died 3rd March, 1930.

By some Lawrence is regarded as a great literary artist, but his realism revolted many. In his genius there was a strong morbid strain.

LAWRENCE, Sir Henry Montgomery, brother of Lord Lawrence, Anglo-Indian soldier and diplomat,

born at Matara, Ceylon, 28th June, 1806, died 24th July, 1857. He obtained a cadetship in the Bengal artillery, proceeded to India in 1821, served in the Afghan campaign of 1843, and acted as agent for the Governor-General on the North-West Frontier, and Resident in Lahore from 1846 to 1849. On annexation he was made Chief Administrator in the Punjab.

At the outbreak of the Mutiny he was made commander-in-chief of the province of Oudh. He attacked the rebels, but was defeated, and, having retired to the residency of Lucknow, he organized the defence, which withstood a four months' siege although the city itself was in rebel occupation. He was wounded by a shell on the second day of the defence, and died two days later.

LAWRENCE, Sir Herbert Alexander, English soldier. Born 8th Aug., 1861, he was a son of the great Lord Lawrence. He entered the army, and as a cavalry officer served in the S. African War, but later left the army for business. In 1914 he rejoined and saw service as a staff officer in Egypt and Gallipoli. Knighted in 1917, in 1918 he was Chief of the Staff to Sir Douglas Haig. In 1919 he left the army and became chairman of the banking firm of Glyn, Mills, Currie & Co., and a director of other large concerns. He was made G.C.B. in 1926.

LAWRENCE, John Laird Mair, Lord, Governor-General of India, born at Richmond, Yorkshire, 24th March, 1811, died in London 26th June, 1879. Educated at Haileybury, he went to India in 1829, and was appointed Chief Commissioner of the Punjab (1853). During the Mutiny he exerted to the utmost the widespread influence which he had gained over the Sikhs, and he was able not only to keep the Punjab quiet, but also to organize 60,000 native troops for the capture of Delhi.

He was known as the 'saviour of India,' and his services were rewarded by his appointment as Governor-General in 1863. On his return to England in 1869 he was raised to the peerage under the title of Baron Lawrence of the Punjab and of Grately. He was buried in Westminster Abbey.—Cf. Sir R. Temple, *Lord Lawrence* (English Men of Action Series).

LAWRENCE, Sir Thomas, English painter, was born at Bristol 1769, died at London 1830. In 1787, he became a student of the Royal Academy, and devoted himself to portrait-painting. He was elected an Associate by desire of the king; succeeded Sir Joshua Reynolds as painter to the king in 1792; became a Royal Academician in 1798; was knighted by the Prince Regent in 1815; and was elected President of the Royal Academy in 1819.

He painted portraits of most of the notable persons of his time. He was the favourite portrait-painter at the English court, and was also employed at Vienna, where he painted the emperor, archdukes, Metternich, &c., and at Rome, where he painted the portrait of Pius VII, one of his finest works.

Lawrence had considerable power as a designer and draughtsman. But

Sir Thomas Lawrence

he often became mechanical and slipshod, and his colour is generally dull and tasteless. His attempts at historical painting on a large scale were complete failures. He is well represented in the National Gallery, Tate Gallery, and Wallace Collection.

LAWRENCE, Thomas Edward, ('Lawrence of Arabia'). English soldier and explorer. Born 15th Aug., 1888, he was educated at Oxford High School and Jesus College, Oxford. A scholarship enabled him to go out to Syria in 1910, and during the next four years he learned a great deal about the Arabs and did excavation work at Carchemish. In 1914 he was employed on geographical work at the War Office, and in 1915 he was sent out to Egypt, Turkey having just entered the war against Great Britain. He then went on to Arabia, where his knowledge of Arab life was invaluable. In that country, negotiating with the Arab tribes, organizing them for war and leading them in battle, he was the mainspring of the campaign

which destroyed the Turkish influence in that region. Officially he was a staff officer with the rank of colonel of the British army.

In 1919 Lawrence attended the Peace Conference in Paris, but he soon left it in disgust. He was made a fellow of All Souls College, and in 1922–23 he acted as adviser to the Colonial Office. In 1922 he enlisted as a mechanic in the air force as T. E. Shaw, a name which he took by deed poll in 1927. He wrote an account of his adventures as *The Seven Pillars of Wisdom*. An abridged edition, called *Revolt in the Desert*, appeared in 1927.

LAWRENCE, a town of the United States, in Essex county, Massachusetts. It contains the State university, and is principally supported by its extensive cotton- and woollen-factories, paper-mills, and manufactures of steam-engines. Created by Act of the Legislation on 20th March, 1845, it became a city in 1853. Pop. (1930), 85,068.

LAWRENCE, ST., a Roman deacon and martyr of the time of Sixtus II. During the Valerian persecution the saint was commanded to reveal the treasures of the Church. For answer he collected the poor and the sick and presented them as the treasure which secured heaven. For this he is said to have been roasted on a gridiron, A.D. 258. His day in the calendar is 10th Aug.

LAWSON, Cecil Gordon, English landscape-painter, was born in 1851, and died in 1882. As a child he studied in the studio of his father, also an artist. To a large extent, however, he was self-taught. He first appeared at the Royal Academy in 1870 with *Cheyne Walk, Chelsea*. *The Minister's Garden* and *In the Valley*, which were exhibited in the Grosvenor Gallery in 1878, attracted much attention. In 1880 he painted *The August Moon*, now in the Tate Gallery. Death cut short his increasing success.

LAWSO'NIA, a genus of plants belonging to the nat. ord, Lythraceæ, containing only one species (*L. inermis*), which is widely cultivated, especially in Oriental regions. It is the plant from which henna is obtained. It is a tall, slender shrub, with a profusion of small white fragrant flowers; it is sometimes spiny and in this state has been described under the name of *L. spinosa*. *See* HENNA.

LAWSON'S CYPRESS (*Cupressus Lawsoniana*), a species of cypress found in the valleys of Northern California, where it grows to the height of 100 feet. It was introduced into Britain in 1852, and has become a favourite in ornamental grounds The branches are numerous and are drooping, slender, and regularly disposed, forming a symmetrical columnar mass of rich green spray.

LAXATIVE, substance gently stimulating the action of the bowels. It may be a food, e.g., cabbage, brown bread honey, prunes; or a mild medicine e.g., sulphur, magnesia.

LAXTONBERRY, fruit first raised in 1930. It is a cross between the raspberry and the loganberry and is grown in the same way as the latter. To ensure fertilization it should be planted near other fruit trees.

LAY'AMON, also called **LAWEMAN,** author of *The Brut*, a metrical chronicle of Britain from the arrival of Brutus to the death of King Cadwalader in A.D. 689, lived soon after A.D. 1200. From his own account he was in orders, and resided at Ernley, near Radstone, or Redstone, now Lower Arley, on the Severn, in Worcestershire, where he would appear to have acted as priest.

Layamon's *Brut* is mainly an amplified translation of the French *Brut d'Angleterre* of Wace, itself merely a translation with additions from Geoffrey of Monmouth's *Historia Britonum*, and that again confessedly a translation from a Welsh or Breton original. Layamon's work appears to have been completed in the first years of the thirteenth century. Its value is chiefly linguistic.

LAY'ARD, Sir Austen Henry, British Assyriologist, archæologist, and diplomatist, born in Paris 5th March, 1817, and died in London 5th July, 1894. In 1839 he travelled in Persia, and subsequently (1845) began his famous excavations among the ruin-mounds of Nimrud, Nineveh, unearthing many rare cuneiform inscriptions and bas-reliefs, publishing the results of his work in *Nineveh and its Remains* (1849) and *Discoveries in the Ruins of Nineveh and Babylon* (1853).

Layard entered Parliament in the Liberal interest (1852), became Under-Secretary for Foreign Affairs in 1860, Commissioner of Works in 1869, and Ambassador at Constantinople in 1877.—Cf. *Autobiography and Letters*, edited by W. N. Bruce (1903).

LAY BROTHERS are an inferior class of monks employed as servants in monasteries. Though not in holy orders, they are bound by the three monastic vows of poverty, chastity, and obedience. They wear a dress somewhat different from that of the other monks. In nunneries a similar distinction prevails between the nuns proper and the lay sisters.

LAYERS, in horticulture, branches pegged down or earthed up until they strike root, when they are separated and grown as separate plants. Many species not readily multiplied by cuttings can be propagated in this way.

LAYNEZ (lī-neth'), **Diego,** second general of the Jesuits, and the real founder of the policy and organization of the society, born in Castile 1512, died 1565. He was educated at the University of Alcala, and from that he went to Paris, where he joined Ignatius Loyola. Laynez was ordained priest in Venice in 1537, and while there he and Loyola formed the project of establishing the Society of Jesus.

After the order had been confirmed by Paul III (1540), and Loyola at the request of Laynez, had been appointed the first general, he made many journeys for the purpose of extending the society of the Jesuits, and in 1558 he succeeded Loyola as general of the order.

LAY-READER, a layman who is permitted to read part of the service in the Anglican Church. The morning or evening prayer cannot be read by a layman unless he has been licensed to do so by a bishop, but the lessons may be read by permission of the incumbent.

LAZ'ARISTS, or **FATHERS OF ST. LAZARUS,** properly **CO GREGATION OF THE PRIESTS OF THE MISSION,** an order of missionary priests founded at Paris by St. Vincent de Paul in 1625. The name Lazarists is derived from the priory of St. Lazaire, which Adrien le Bon offered for the use of the brethren of the order in 1632.

The institution of the Lazarists was approved by Pope Urban VIII in 1632. The object of the Lazarists was that of supporting missions and of ministering to the spiritual wants of the poor.

The foundation was confirmed by letters-patent of Louis XIII, May, 1627, and the missionaries were erected into a congregation by Pope Urban VIII, 12th Jan., 1632. They have houses in all quarters of the world, and their total number is over 3,000.

LAZ'ULITE, blue-spar, a hydrous phosphate of aluminium, magnesium, and iron, a mineral of a light or indigo-blue colour, crystallizing in monoclinic forms. It occurs usually as small veins.

LAZZARO'NI, formerly a class of persons in Naples without employment or home, and having no settled means of support. The name is said to be derived from that of Lazarus in the parable, though it is more directly connected with the hospital of St. Lazarus, which served as a refuge for the destitute of the city. For a long time they played an important part in all Neapolitan revolutions, and under Masaniello accomplished the revolt o. 7th July, 1647, against the duc d'Arcos. They are now no longer a separate class, though the name is still loosely applied to the boatmen and fishermen of the city.

LEA, a tributary of the Thames, rising in Bedfordshire, entering Hertfordshire, flowing past Hertford and Ware, and, after forming the eastern boundary of Herts and Middlesex, entering the Thames just below Blackwall. Its length is about 46 miles, and it becomes navigable at Hertford.

LEAD, a metal of a bluish-grey colour, with a high metallic lustre when recently cut, but soon tarnishing on exposure to the air, owing to the formation of a coating of carbonate of lead. Symbol, Pb (Lat. *plumbum*); atomic weight, 207·2; specific gravity, about 11·38. It is soft, flexible, and inelastic. It is both malleable and ductile, possessing the former quality to a considerable extent, but in tenacity it is inferior to all ductile metals. It fuses at about 620° F., and when slowly cooled forms octahedral crystals.

It is a widely distributed metal. It is a constituent of a very large number of minerals, but in practice the metal is got from only a few of these, especially from the sulphide, carbonate, and one or two others.

The most important of all the ores of lead is the *sulphide* or *lead glance,* also known as *galena* (q.v.). The *carbonate,* also called *cerusite,* or *lead-spar,* like most lead salts, is perfectly unmetallic in its appearance, and is not infrequently rejected from among common lead ore as an earthy mineral. It occurs in veins in primitive and secondary rocks, accompanying galena and other ores of lead. It is abundant in several European countries, in Britain, in Ireland, and it has been found in various localities in the United States.

The sulphate of lead, anglesite, or *lead vitriol,* was found originally in Anglesey. *Chromate of lead, crocoisite,* or *crocoite* was originally found in Siberia. It was in it that *chromium* was first discovered. *Phosphate of lead* is found accompanying the common ores of lead, though rarely in any considerable quantity. Finely crystallized varieties are found at Leadhills in Scotland, and in Cornwall.

There are five oxides of lead: (1) The suboxide (Pb_2O), of a greyish-blue colour. (2) The monoxide or

yellow oxide (PbO), called also *massicot*. When produced by oxidation at a temperature above its fusing-point, PbO takes the form of shining yellow scales, called *litharge*. (3) The red oxide (Pb_3O_4), the well-known pigment called *red-lead* or *minium*. (4) The dioxide or brown oxide (PbO_2), obtained by treating red-lead with dilute nitric acid. (5) The sesquioxide (Pb_2O_3), obtained by oxidizing an alkaline solution of the monoxide.

Of the salts formed by the action of acids on lead or on the monoxide, the carbonate or white-lead and the acetate or sugar of lead are the most important. The monoxide is also employed for glazing earthenware and porcelain. Carbonate of lead is the basis of white oil-paint and a number of other colours. The salts of lead are poisonous, but the carbonate is by far the most virulent poison.

Lead is one of the most easily reducible metals, and from the native carbonate can be got by simply heating with coal or charcoal. The sulphide, however, which is the most abundant of its ores, is not so readily acted on by coal, and a reverberatory furnace, or a special variety of blast-furnace, is employed.

The blast-furnace is now far the most common, being much cheaper to work and giving a larger output, while the charge can be modified so as to allow of the smelting of ores of all classes. For this process the ore is first submitted to a roasting and sintering operation, and then smelted in rectangular or circular water-jacketed blast-furnaces, coke being used as fuel and oxide of iron as flux.

Lead obtained by any process is usually too hard for use owing to impurities; or it may contain a valuable percentage of gold or silver, and hence receives further treatment. Nearly all lead contains silver, and generally enough of the precious metals to make it worth extracting. This is commonly done by what is called the zinc process, depending on the fact that while zinc and lead mix when liquefied, they separate almost entirely on cooling, the zinc owing to its lightness rising to the top and carrying the silver with it, which can then be secured. The lead, when judged sufficiently pure, is cast into ingots or pigs of lead.

One part of tin and two of lead form an alloy fusible at 350° F., which is used by tinmen under the name of *soft solder*. With antimony lead forms the important alloy called *type-metal*. *Pewter* is a hard alloy of four parts of tin and one of lead. For the poisonous effects of lead *see* LEAD-POISONING.

LEADER, Benjamin Williams, English artist. Born at Worcester, 12th March, 1831, the son of E. Leade Williams, he studied art in his nativ town, and in London, and made reputation by his English landscapes In 1883 he was elected A.R.A. and in 1888 R.A. He died 22nd March, 1923

LEADHILLS, a mining village in South Lanarkshire, the highest in Scotland (1,320 ft.), on Glengonnel Water. Lead-mines were worked there in the thirteenth century, and since the middle of the nineteenth century the output has been considerable. Allan Ramsay, the poet, was born there in 1686. Pop. 829.

LEAD-LINE, a device used on shipboard for ascertaining the depth of water and the nature of the sea-bed. The lead weighs from 10 to 14 lb., and carries a hollow on the under side which is filled with tallow, to which a sample of the sea-bed clings when the line is hove. The line is made of 1¼-inch white hemp, and has a length of 25 fathoms. It is marked by means of leather, knots, and bunting to facilitate the calling of soundings.

The fathoms at 1, 4, 6, 8, 9, 11, 12, 14, 16, 18, 19 are not marked, and are called *deeps*. The *deep-sea lead* has been almost entirely superseded nowadays by the *sounding-machine*, but has to be used when the machine breaks down. It is similar to the hand-lead, weighs about 28 lb., and carries a hollow bottom. The line, 100 fathoms in length, is marked similarly with the hand-line, but in carrying on soundings the ship is stopped.

LEAD-POISONING (Plumbism) is usually chronic, and occurs among workers in lead and those engaged in the preparation of white-lead and other lead compounds. It is seen in painters, plumbers, and compositors. The chief symptoms are anæmia, marked weakness, colic, kidney disturbances, and neuritis, usually in the arm. A characteristic blue line appears on the gums if the teeth and mouth are neglected. Later, disease of the arteries appears, and is a most serious sequela.

When lead-poisoning is present, all possible further absorption should be avoided by the patient, and treatment undertaken for the elimination of the poison; but now in all works where lead is in use poisoning should be prevented by inspection and protection of the worker, and by the provision of suitable washing accommodation.

LEAF, a lateral appendage of the stem, typically thin, flattened, horizontal, and coloured deep-green owing to the presence of numerous chloroplasts. Leaves arise from the superficial layers of the apical region of the stem, but differ widely in struc-

ire from the axis, being constructed
› as to expose a large area of green
ssue for the purpose of carbon-
ssimilation and transpiration. The
xpanded portion or blade (*lamina*) is
sually supported on a stalk (*petiole*),
ut the latter is absent in sessile
›aves.

The tissues of an average leaf are 1) an upper (ad-axial) and a lower ab-axial) *epidermis*, which meet at he leaf-margin; (2) an elaborate ystem of *veins* or *vascular strands*, liverging from a mid-rib (in dicoty-edons) or from a series of longitudinal ›rincipal veins (in monocotyledons); 3) a web of green parenchyma or *nesophyll*, occupying the interstices of the vascular network.

In ordinary horizontally expanded leaves the mesophyll consists of closely packed *palisade-cells* rich in chlorophyll next the upper surface, and of a *spongy tissue* of irregular cells with large intercellular spaces towards the lower side.

Stomata may occur in both epidermal layers or only in the lower epidermis. Carbon-assimilation takes place mainly in the palisade tissue, and the leaf as a whole probably represents the chief chemical laboratory of the plant, as it is here especially that the food-materials brought from the soil to the transpiration-stream meet with the carbon fixed by the chloroplasts.

Leaves are arranged on the stem in an orderly manner, either in pairs (*opposite*), or singly in spirals of varying steepness (*alternate*). By this means, and also through variations in length of the leaf-stalks, and bending or twisting of the petiole or of the blade itself, overlapping is avoided as far as possible, so that each leaf obtains a proper degree of illumination.

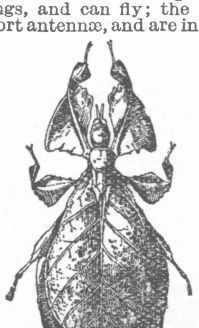
The leaves of xerophytes, water-plants, &c., and leaf-structures borne on underground stems or on floral axes, are often greatly modified from their typical form.

LEAF-CURL, a destructive disease of the peach tree. The leaves become curled and discoloured, and fall off before their time; infected branches bear no fruit. It is due to a fungus, *Exoascus deformans*, and can be checked by spraying and rigorous pruning. *See* MACROSPORIUM.

LEAF-CUTTING INSECTS, a name given to certain species of solitary bees (*Megachile* and *Osmia*), from their lining their nests with fragments of leaves and petals of plants cut out by their mandibles. Some of the ants (species of Atta), native to tropical America and Texas, are also leaf-cutters. The pieces of leaf are stored underground, and a kind of fungus is cultivated upon them to serve as food.

LEAF-INSECTS, the name given to the orthopterous insects of the genus Phyllium, belonging to the family Phasmidæ, and popularly known also by the name of **walking-leaves**. Some of them have wing-covers so closely resembling the leaves of plants that they are easily mistaken for the vegetable productions around them. The eggs, too, have a curious resemblance to the seeds of plants.

They are for the most part natives of the tropical regions of the Old World. The males have long antennæ and wings, and can fly; the females have short antennæ, and are incapable



Leaf Insect

of flight. Stick-insects belong to the same family.

LEAGUE (from the Gaulish *leuca*, *leuga*), a measure of length which was adopted by the Romans from ancient Gaul, and fixed at 1,500 *passus* or paces, practically a mile and a third. The English league, introduced by the Normans, was equal to about 3 modern statute miles, and this is still used as a geographical (nautical) measure for one-twentieth of a degree (3 nautical miles), equivalent to about $3\frac{4}{10}$ statute miles. The French metric league is reckoned as equal to 4 kilomètres or 4,374 yards.

LEAGUE, historically, an alliance or confederacy between princes, states, or peoples (*Solemn League and Covenant*) for mutual aid or defence. What in French history is known distinctively as *The League* (*Sainte Ligue* or *Holy League*) was that organized by Henry, duc de Guise, in 1576, against Henry II of France. Its ostensible object was the consolidation of Roman Catholicism, but the

Guises used the League for political leverage to secure the throne upon the death or removal of the king, whose heir-apparent was the Huguenot Henry of Navarre.

The great popularity of the Guises brought all Paris and half the provinces under the banner of the League, which was sanctioned by the Pope and applauded by the King of Spain. In 1588 the duc de Guise and his brother, Louis the Cardinal, were murdered at Blois at the king's instigation, whereupon the League declared the throne to be vacant, and named Charles, duc de Mayenne, the third brother of Guise, Governor-General of the kingdom. Henry III appealed to Henry of Navarre for assistance, but was assassinated by a fanatic leader in 1589.

As heir to the throne, Henry of Navarre waged war with the League until 1593, when he effected a compromise by abjuring the Protestant faith and becoming nominally a Catholic, when the League was formally dissolved. Several of the novels of Alexandre Dumas are based on the activities of the League.—Cf. F. A. M. Mignet, *Histoire de la Ligue*.

LEAGUE OF NATIONS. The idea of a League of Nations was first publicly proclaimed by President Wilson, and clearly stated by him on 8th Jan., 1918. It constitutes the fourteenth of his famous Fourteen Points: "A general Association of nations must be formed under specific covenants for the purpose of affording mutual guarantees of political independence and territorial integrity to great and small states alike." Before Wilson espoused the project, it had been popularized in the United States by his predecessor in the presidency, W. H. Taft, who formed, with others, the League to Enforce Peace; Lord Robert Cecil moreover, and other distinguished statesmen, had developed the idea of a League of Nations in 1916–17.

The Covenant of the League of Nations, as adopted by the plenary session of the Peace Conference on 28th April, 1919, and embodied in the Treaty of Versailles, defines the League as follows: "In order to promote international co-operation and to achieve international peace and security, by the acceptance of obligations not to resort to war, by the prescription of open, just and honourable relations between nations, by the firm establishment of the understandings of international law as to actual rule of conduct among Governments, and by the maintenance of justice and a scrupulous respect for all treaty obligations in the dealings of organized peoples with one another, the high contracting parties agr to this Covenant of the League Nations."

The members of the League bin themselves not to employ force t settle a dispute, until they have fir submitted the matter to arbitrato appointed by the League, waited si months for the decision, and the allowed a further three months t elapse, after an award has been mad by the arbitrators or a report has bee made by the council of the League.

The *Primary Organs* of the Leagu are five in number: (1) The *Counci* which has five permanent members— the British Empire, France, Germany Italy, and Japan—and nine non permanent members elected for one two, or three years. It meets at leas four times a year.

(2) The *Assembly*, which meet annually on the first Monday o September, and also if, and when, a extraordinary meeting is summoned and to which each State member may send a delegation of three delegates and three substitute delegates (each State having, of course, only one vote). The president for the session is elected at the first meeting. The Assembly divides into six principal committees—*Juridical, Technical Organizations, Disarmament, League Finance, Social Questions*, and *Political Questions and Admission of New Members*.

(3) The *Secretariat*, which consists of the permanent officials under a Secretary-General.

(4) The *International Labour Organization*, which is assisted by standing International Commissions on *Maritime Affairs, Agriculture, Emigration, Industrial Hygiene, Social Insurance*, and *Native Labour*.

(5) The *Permanent Court of International Justice*, at The Hague, which has 11 judges and 4 deputy judges.

The *Secondary Organs* of the League comprise *Technical Organizations* (*Economic and Financial, Health, Transit, Labour*); *Advisory Commissions* (*Military, Naval, and Air, Reduction of Armaments, Mandates, Opium, Social*); *International Bureaux* (*Hydrographic, Relief, Institute of Commerce, Institute of Intellectual Co-operation* at Paris, *Institute of Private Law* at Rome); and *Administrative Organizations* (*Saar Governing Commission, High Commissioner for Danzig*).

The League took a prominent part in post-war boundary adjustments, delivered mandates for certain exenemy territories, stabilized the finances of Austria and Hungary, and performed numerous other similar tasks. The value of League arbitration in international disputes has been demonstrated several times, and since

formation it has been much con-ned with the problems of disarma-nt. Every department, committee, l commission is busily employed, l the work and usefulness of the igue is constantly increasing.

The Covenant contains twenty-six icles, and was signed by the follow-: states and signatories of the eaty of Peace: Australia, Belgium, livia, Brazil, Canada, China, Cuba, echoslovakia, Ecuador, France, eece, Guatemala, Haiti, Hejaz, onduras, India, Italy, Japan, Liberia, ew Zealand, Nicaragua, Panama, eru, Poland, Portugal, Rumania, am, South Africa, United Kingdom, nited States of America, Uruguay, ugoslavia.

The following states were invited to cede to the Covenant and ultimately d so: Argentina, Chile, Colombia, enmark, Netherlands, Norway, Para-ay, Persia, Salvador, Spain, Sweden, witzerland, Venezuela. At subsequent ssemblies of the League Albania, ustria, Bulgaria, Costa Rica, Fin-nd, Luxembourg, Estonia, Lithu-nia, Latvia, Hungary, Irish Free tate, Abyssinia, Santo Domingo, and ermany (*see* below) were admitted.

By the League constitution Germany ot a permanent seat on the Council n admission in 1926, as the U.S.A. nd Russia will if, and when, they oin. The U.S.A., Ecuador, and Hejaz re not now members.

Two years' notice of withdrawal rom the League is necessary, and his was given by Costa Rica in 1924, by Brazil and Spain in 1926 and by Japan in 1933. In 1928 Spain resolved to continue a member. Argentine, owing to a dispute, never sends a delegation to the Assembly.

The official seat of the League is Geneva, and the official languages are English and French. The cost of the League (about £1,000,000 per annum) is met by the State members, each of whom pays an agreed proportion. (Britain's share is about three twenty-ninths.)—BIBLIOGRAPHY: D. J. Hill, *The Rebuilding of Europe*; J. S. Basset, *The Lost Fruits of Waterloo*; D. S. Morrow, *The Society of Free States*; S. P. Duggan, *The League of Nations: the Principle and the Practice*; H. N. Brailsford, *A League of Nations*; G. Lowes Dickinson, *The Choice Before Us*; J. A. Hobson, *Towards International Government*; *A Handbook for Speakers on a League of Nations, compiled by the League of Nations Society*; Sir Geoffrey Butler, *A Handbook to the League of Nations*.

LEAMINGTON (Royal Leamington Spa), a municipal borough and watering-place of England, in Warwickshire, served by the Great Western and L.M.S. Railways. The springs include the three varieties of sulphureous, saline, and chalybeate. Pop. (1931), 29,662.

LEAP-YEAR, one of the years of 366 days, including the date 29th February. Every year is a leap-year which is divisible by four without remainder, except the concluding years of centuries, every fourth only of which is a leap-year; thus the years 1800 and 1900 are not leap-years, but 2000 and 2400 are. *See* CALENDAR.

LEAR, Edward, British artist and author, was born at Holloway on 12th May, 1812, and died in Jan., 1888. He began his career as an artist with various ornithological drawings. In 1831 he became a draughtsman to the Zoological Gardens, and in 1832 he published *The Family of the Psittacidæ*, a volume of coloured plates. His work attracted the attention of the thirteenth Earl of Derby, who employed Lear from 1832 to 1836 to draw his menagerie at Knowsley.

Lear became a great favourite with the Stanley family, especially with the grandchildren, and it was for the future fifteenth earl that *The Book of Nonsense* was composed. This book was extremely popular; it was published in 1846, and ran through twenty-six editions in its author's life-time. It was followed by other works of a similar nature: *Nonsense Songs and Stories* (1871), *More Nonsense Songs* (1872), and *Nonsense Botany and Nonsense Alphabets*.

Lear, if not the inventor, was at any rate the popularizer of the 'Limerick'; indeed it has been suggested that this word has been coined from his name, being a variant of the jocular word 'Learic,' coined by Father Matthew Russell. Lear was an indefatigable traveller; he left England in 1837 on account of his health, and never again resided there permanently.

He produced several illustrated books of travel, such as *Journal of a Landscape Painter in Southern Albania* (1852) and *Journal of a Landscape Painter in Corsica* (1870). One of his last works (posthumously published) was a set of about two hundred illustrations to Tennyson's poems. He was a personal friend of Tennyson, who addressed him in a poem entitled *To E. L. on his Travels in Greece*. Lear's Nonsense Books are classics in their way.

LEASE AND LEASEHOLD. A lease may be defined as a permission to occupy lands or tenements for life or a certain number of years, or during the pleasure of the parties making the contract. The party letting the lands or tenements is called the *lessor*, the party to whom they are let the *lessee*, and the compensation or consideration for the lease the *rent*.

A lease for a period not exceeding three years may be by verbal contract. If, however, the term be longer than three years, the lease must be by deed. A breach of any of the covenants contained in a lease was formerly sufficient to render it void, but now any breach may be compensated by a money payment. The power to lease necessarily depends upon the extent of the lessor's estate in the land or tenement to be leased.

A proprietor who has only a life-estate can of course lease his property only during his life. This is the case with a great part of the landed estates of Europe, the very object of entailments and other limitations being to secure the property against alienation, and against incumbrances to the prejudice of the heir or successor to the inheritance; and yet if the incumbent could not make a lease for a certain time, it would be a great abridgment of the value of the estate to himself, as well as to his successor. The laws therefore provide that certain proprietors of estates for life may lease, on certain terms, for any time not exceeding a certain period, as twenty-one years.

The English common law makes a distinction as to the dignity of leasehold estates, which in many cases does not correspond to their comparative value and importance, the maxim being that a life-estate, being that of a freeholder, is greater or of more dignity than a lease for ever so many years, as a hundred or a thousand. A freehold is real estate; whereas a lease is but a chattel interest, though the term may be longer than the longest life. *See* LANDLORD AND TENANT.

LEATHER is the name given to the non-putrescible substance formed when the skins of animals are treated by various processes. Wet skins putrefy and decay, whilst dry ones are hard and horny; the art of leather manufacture deals with the conversion of the raw skins into a permanent flexible substance.

The manufacture of leather was probably one of the earliest arts practised by mankind, and there is evidence to show that the method used consisted in rubbing the fat of the animal on the raw skin, and kneading and stretching it in a warm place until a soft and durable leather was obtained.

Similar methods, dependent on the use of butter, egg-yolk, brains, oils, &c. are used at the present time by the Tartars, North American Indians, and other peoples, and also in the dressing of furs, and the manufacture of chamois-leather and of certain kinds of laces.

In the preparation of leather the hides and skins of various mammalia, such as oxen, cows, horses, goats, sheep, deer, &c., are chiefly used. Such skins consist essentially of two layers: the outer one, called the *epidermis*, is composed of cellular tissue containing the roots of the hair, and is valueless from the tanner's point of view; whilst the thicker inner layer, termed the *corium* or true skin, is the part which is converted into leather.

The corium consists of a network of fine colourless fibres, which are capable of being split into still finer fibrils. Chemically, the substance of which it is composed is closely related to gelatine (q.v.), into which it is readily changed on boiling with water. Before the hides or skins can be converted into leather, various preparatory processes are necessary to remove the hair and to fit the skin for tanning.

Soaking. If the hides are uncured ('green'), they are soaked in water for a few hours to restore them to their soft and natural condition and to remove adhering blood and dirt. Wet-salted hides require a longer soaking in several changes of water, and those which have been dried or dry-salted need a still longer time, and also a certain amount of mechanical action to soften them thoroughly.

During the soaking process great care must be taken to avoid putrefaction, or the resulting leather will be of an inferior quality. For this reason the addition of antiseptics to the water used for soaking is advisable in hot weather.

Depilation is the term applied to the process by which the hair is removed. This may be effected in two different ways.

The method of depilation which is now almost universally used is known as 'liming,' and is carried out as follows:

The soaked hides or skins are placed in pits containing milk of lime, i.e. slaked lime stirred up into a cream with water and further diluted. They are hauled out of the pits and put back again each day to ensure uniform action, the time of treatment varying from a few days to about three weeks, according to the nature of the skin and the type of leather required.

The lime loosens and partially dissolves the epidermis and hair; it also swells the gelatinous fibres of the corium, and at the same time dissolves the cementing substance between them, loosening and separating them into their finer fibrils. The further this action proceeds the softer and looser is the resulting leather.

For sole leather, where a firm and solid product is required, only a short liming is needed. The addition of caustic alkalies or sulphides of lime,

a, or arsenic to the milk of lime ften made to hasten the process of aairing and to produce leathers ring special characteristics. Whichever method of loosening the r be adopted, its removal is ected by scraping with a blunt two-adled knife. Sheepskins may be un-ired by painting the flesh side with nixture of slaked lime and sodium phide in the form of a paste. After ew hours, the wool is loosened suffi-ntly to be pulled out by hand in an damaged state; the skin may then further prepared for tanning.

Deliming. Before the unhaired des can be actually converted into ather it is essential that the lime ntained in them be completely re-oved, as its presence would inter-re with the tanning processes. For le leather, the hides, after a thorough ashing in soft water or dilute acids dissolve out the lime, are ready for ie actual tanning process, but for the ofter leathers more thorough treat-ient is necessary, not only to remove ie lime but to soften the skin still arther by removal of more of the ementing substance between the bres. This treatment is known as bating,' and consists in steeping the kins in a fermenting infusion of)igeon- or hen-dung.

The nature of the process is not horoughly understood, but the soften-ng effect is due to the destructive ction of ferments on the cementing substance, while at the same time the lime is partly removed by the solvent action of the weak organic acids pro-duced in the process. For the lightest leathers, such as glove-kid and lamb, dog-dung is used, and the process is then known as 'puering.' In both cases the skins lose the swollen condition attained during liming and become extremely relaxed and soft.

These dung infusions are somewhat uncertain in their action, and may readily lead to permanent damage to the skins if the process is carried too far. To take their place, a material called 'erodin' is now often used; it consists of a nutritive medium pre-pared from gelatinous matter, which, when inoculated with a pure culture of *bacillus erodiens*, is capable of imitating the effect of the dung in-fusions, but with less danger to the skins.

In the manufacture of the softer varieties of leather it is necessary at this point to treat the skins with a slightly acid liquor in order to com-plete the removal of lime. The method employed is known as 'drenching,' and consists in immersing the skins in a fermenting infusion of bran. Acetic and lactic acids are formed, which dis-solve the last traces of lime and also slightly swell the skin. In place of the bran drench, weak acids such as lactic, formic, and boric acids may be used with success.

Tanning. Tannin or tannic acid is obtained from various vegetable pro-ducts, such as oak-bark (which is one of the oldest tanning materials), sumach, cutch, gambier, myrobalans, chestnut extract, valonia, &c. On extracting these materials with water, a solution of the tannin is obtained which has the property of combining with the gelatinous fibres of the hide or skin to form an insoluble and stable product, leather, which remains soft and flexible on drying. Owing to the impervious nature of the hide, the complete penetration of the tan-liquor takes a considerable time, vary-ing with the thickness of the hide and the strength of the liquor.

If too strong a liquor were used at the commencement, the outside of the hide would become hard and con-tracted, producing what is known as 'drawn-grain'; the subsequent tan-ning of the interior would also be im-peded. This is avoided by the use at first of a very weak infusion, which has already been used for hides in a more advanced state; the hides are then suspended in pits containing successively stronger liquors. In the latter part of the process the hides are frequently dusted with some ground tanning material, and laid in still stronger liquors for periods of about a week at a time.

The tanning of hides for sole-leather occupies from three to six months; formerly two years or more were required when oak-bark alone was used as a source of tannin. The tanned hides are washed in water, dried, smoothed, and compressed by mechanical means, and are then ready for use.

The finer and lighter varieties of leather, such as goat, calf, sheep, seal, &c., for bookbinding, upholstery, and many other purposes, are mostly tanned with sumach, the skins being treated in drums, or in vats fitted with paddles, in order to ensure uniform treatment and to hasten the process, the time of tannage varying from one or two days to a few weeks.

Tawing is the name applied to the process by which skins are converted into leather with the aid of metallic salts, those of aluminium and chro-mium being the most important commercially.

Alum tawing is used chiefly for the production of white leathers, such as glacé-kid, calf-kid, 'skivers' for cap-ping chemists' bottles, and for the dressing of sheepskins in the wool. The skins prepared in the manner already mentioned are treated in a

rotating drum for several hours with a warm solution of alum and salt, with or without the addition of egg-yolk and flour, and are allowed to lie in piles overnight.

Next day they are hung up to dry, at first in the air, and finally in a moderately hot room. When dry, the skins, which are hard and horny, are damped back with water to a half-dry condition, and 'staked' by drawing them across a blunt-edged knife fixed in a vertical position. They are then allowed to 'age' for from one to two months in order to fix the tannage, soaked out in water to remove the superfluous alum and salt, and finally dried and again staked.

Chrome-tanned leathers are made by drumming the skins for several hours in a solution of chrome alum or of chromium sulphate, rendered slightly basic with soda; they are then allowed to lie in piles for some days, and after washing are treated with a weak solution of borax or some other mild alkali to remove all traces of acidity. The skins are finally treated with a 'fat-liquor' (an emulsion of soap and oil) to improve the quality of the leather, which would otherwise be of a somewhat 'woolly' nature.

Chrome tanning may also be carried out by what is known as the two-bath process, in which the skins are first steeped in a slightly acid solution of potassium or sodium bichromate, and then transferred into a solution of sodium thiosulphate (photographers' 'hypo'), also slightly acidified.

Chrome leather has largely replaced vegetable-tanned leather for many purposes, owing to the short time occupied in tanning and also because of its strength and resistance to steam and high temperatures. 'Box-calf' and 'willow-calf' for boot and shoe uppers are made by this process.

Chamoising. Wash-leather or chamois-leather is prepared from the skins of sheep, deer, &c., by treating them with various oils; cod, seal, and whale oils being usually employed. Buff leather is a similar product obtained from ox or cow hides. The prepared hides or skins are smeared with the oil in the slightly moist state, and placed in a mill which beats and kneads them. During this process the oil is absorbed by the skins, and the moisture evaporated off by the heat produced by friction in the mill.

When there is no longer any fleshy odour from the skins, they are hung up in a warm room; this produces a gentle oxidation, causing a permanent combination between the oil and the skin. The excess of oil is then pressed out, and the skins washed in a hot soda solution and dried.

Currying is the term given to t finishing process, applied to leatl intended for boot uppers, harne belting, and other purposes, wh flexibility and resistance to water required. It consists essentially impregnating the leather with fa oils, and waxes, but includes al many mechanical processes, such scouring, shaving, &c., which impro the appearance of the leather.

For the uppers of boots and sho the leather is 'coloured' by rubbing a mixture of oil and lamp-blac followed by sizing and smoothing t pressure. For patent and enamelle leathers, successive coats of a varnis composed of Prussian blue boiled wit linseed oil are applied. 'Morocc leather is made from goatskins tanne with sumach. It is glazed by dampin with a solution of albumin and mill and, after drying, is polished by fri tion under a smooth cylinder of agat —BIBLIOGRAPHY: H. R. Procte *Principles of Leather Manufacture* C. T. Davis, *Manufacture of Leather*.

LEATHER, ARTIFICIAL, th general name of certain fabrics pos sessing some of the qualities, and ofte the appearance of leather. One of th earliest methods of fabrication con sisted in applying oily pigments t cloth which was subsequently rolle and coated with a sort of enamel paint An article of this sort, known unde the name of leather-cloth was first produced in America about 1849.

Another kind consists of leathe parings and shavings reduced to a pulp, and then moulded into buckets, machinery-bands, picture-frames, and other useful and ornamental objects. A so-called vegetable leather consists of caoutchouc dissolved in naphtha, spread upon a backing of linen. It is of considerable strength and durability, and is used for table-covers, carriage-aprons, soldiers' belts, harness, and bookbinding. Most artificial leather is obtained by varnishing textiles with coatings of some resinous substance, and then painting or embossing them.

LEATHERHEAD, a town of England, in Surrey, on the Mole, 12½ miles E.N.E. of Guildford, with a school for clergymen's sons, and some breweries. Some regard Leatherhead as the 'Highbury' of Jane Austen's *Emma*. Pop. (1931), 6,916.

LEATHER-HEAD, an Australian bird, the *Philemon corniculatus*, a species of honey-eater, so called from its head being devoid of feathers and presenting a leathery appearance; called also *Friar-bird* or *Monk*, and, with reference to its note, *Four o'clock*, *Poor Soldier*, and *Pimlico*.

LEATHERWOOD, sole American

ius of shrubs of the spurge-laurel ler (*Dirca*). The Atlantic and Calinian species yield a tough inner rk used by N. American Indians for rous thongs. Their acrid properties e delcterious, both externally and ernally.

Leatherwood is also the name of the ose-grained timber of a tree that ows in New South Wales. It longs to the saxifrage order and has distinctive odour.

LEAVEN, dough in which fermention has commenced, employed to rment and render light the fresh ough with which it is mingled. Its e dates from remotest antiquity, id it is especially mentioned in the ible, where the Israelites are strictly rbidden to eat anything leaven uring the festivity of Mazzot, or assover (*Exod.* xii and xiii; *Deut.* vi). In the New Testament leaven nd corruption are sometimes rearded as synonymous terms, e.g. *Iatt.* xvi, 6–12; *Mark* viii, 15.

LEAVENWORTH, river port, railray centre, and commercial city of Kansas, United States, on the Missouri, in a rich agricultural region. There are sawmills, flour-mills, brickworks, breweries, manufactories of carriages, wagons, furniture, and shoes, also coal-mines in the vicinity. Founded in 1854, it became a city in 1855. Pop. (1930), 17,466.

LEB'ANON, a town of the United States, in Lebanon county, Pennsylvania. It is a seat of iron and other industries. Settled in 1743, it became a city in 1885. Pop. (1930), 25,561.

LEB'ANON, MOUNTAINS OF, two nearly parallel mountain ranges in the north of Lebanon, stretching from south-west to north-east, and enclosing between them a valley about 70 miles long by 15 miles wide, known anciently as Cœlē-Syria, now called Buka'a.

The range on the west is called Lebanon, and that on the east Anti-Lebanon; the Arabs, however, call the former Jebel-Libnan, and the latter Jebel-el-Shurky.

Lebanon, which runs almost parallel to the Mediterranean coast, is the loftier range of the two, and presents almost a continuous ridge. Though under the snow limit, snow and ice remain throughout the year in the higher ravines.

In the south part of the chain the Upper Jordan has its source. The habitable districts are occupied towards the north by the Maronite Christians, and towards the south by the Druses. The forests of cedar for which Lebanon was famed have to a large extent disappeared.

LEBANON, THE GREAT, a Republic of Syria, founded 1st Sept., 1920, and under French protection. It extends in a narrow strip from the Palestine frontier northwards to Dahr el Qadib, and east to west from the Mediterranean to the heights of Anti-Lebanon. Beirut is the capital; other towns being Tripoli (pop. 37,260) and Zahle (pop. 14,000).

Charles Lebrun

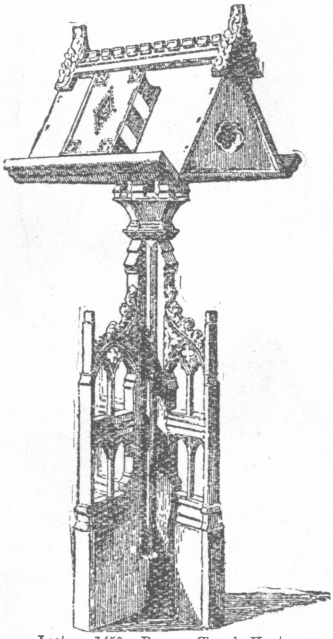
The state is traversed north to south by the Syrian Trunk line (Hejaz Railway) with branches to Tripoli and Beirut. Tobacco, iron, and lignite are produced. Sunnite Mahommedanism with some Shiah prevails. There is a legislative assembly which meets in Beirut, the seat of government. Area, 4,300 sq. miles; pop. 862,618.

LEBRIJA (le-brē'hå; Lat. *Nebrissa Veneria*), a town of Spain, Andalusia, province of Seville, and 28 miles south by west of the city of that name, near the left bank of the Guadalquivir. Pop. 11,506.

LEBRUN (lē-brůn), **Charles,** French painter of historical and mythological subjects, born at Paris in 1619, died in 1690. He studied with Vouet, and

then in Rome under Poussin. On his return he was employed by Lambert de Thorigny at his hotel on the Île St. Louis, and by Fouquet at Vaux; and was introduced by Mazarin to the king. In 1648 he took part in the foundation of the new Royal Academy of Painting and Sculpture, of which he became president.

From 1661 he was principally employed in the decoration of the residences of Louis XIV, notably the



Lectern. 1450. Ramsay Church, Hunts.

Louvre, Versailles, Sceaux, and Marly. Under Colbert, he not only carried out several series of monumental paintings, but supervised and controlled a large staff of artists engaged on similar work. In particular, he was director of the Gobelins Tapestry Manufactory. After the death of Colbert, in 1683, Lebrun was superseded by his rival, Mignard. Lebrun's work admirably reflects the age. Dignified and heroic in conception, it is often merely pompous.

LE BRUN, Marie Louise Elizabeth (née *Vigée*), French painter, born in Paris 1755, died there in 1842. She studied under Briard, was influenced by Greuze and Joseph Vernet, soon became a popular painter at court of Marie Antoinette. In 1 she was elected a member of Academy.

During the Revolution she worl in Italy, Vienna, and St. Petersb (Leningrad), returning to France 1801. She stayed in England fr 1802 to 1805, and was in Switzerla from 1808 to 1809, but finally settl in France. Her work includes ma portraits of considerable superfic charm, and allegorical subjects sen mentally treated. She and h daughter are the subject of a famo picture by David, now in the Louvr

LE CATEAU. *See* CATEAU CA BRÉSIS.

LECCE (let'chā), a town in Southe Italy, capital of the province of i own name, 50 miles E.S.E. of Tarant Pop. (1931), 46,782.

LECCE, a province of Souther Italy, between the Adriatic Sea an the Gulf of Taranto; area, 1,069 s miles; pop. (1931), 487,138. Chi towns are Lecce, Otranto, an Brindisi.

LECCO, a town of Northern Italy on an arm of Lake Como called Lak Lecco (*Lago di Lecco*). It is a steam boat station and a semi industria town. Pop. 29,000.

LECKY, William Edward Hartpole historical writer, born near Dublir 1838, died in 1903. He was educated at Dublin University, for which he was member of Parliament from 1896 to 1903. He was made a Privy Councillor in 1897. He wrote: *Leaders of Public Opinion in Ireland*; *History of the Rise and Influence of the Spirit of Rationalism in Europe*; *History of European Morals from Augustus to Charlemagne*; *History of England in the Eighteenth Century* (8 vols.), afterwards published in two portions dealing with England and Ireland respectively.

LECTERN, the reading-desk or stand on which the larger books used in the service of churches are placed. They have been made of various materials and often in highly artistic forms. Many are in the form of an eagle, the outspread wings supporting the volume. In the lecterns of the Pisan Tuscan schools of the twelfth, thirteenth, and fourteenth centuries the eagle rests upon a group of the three other living creatures, symbols of the Evangelists, the Angel, the Lion, and the Bull.

LECYTHIDACEÆ, a nat. ord. of polypetalous dicotyledons, consisting of large tropical trees, and including the brazil-nut (Bertholletia), sapucaia-

nut (Lecythis), and cannon-ball tree (Couroupita).

LEDA, in Greek mythology, the wife of the Spartan king Tyndareus. By Zeus, who took the form of a swan, she was the mother of Castor and Pollux. In another story she was the mother by Zeus of Pollux and Helen, and by Tyndareus of Castor and Clytemnestra.

LEDBURY, a town of England, in Herefordshire, at the southern extremity of the Malvern Hills, 14½ miles from Hereford. It has a handsome ancient church in the Norman style, with a detached tower and spire. It was at Ledbury that Mrs. Browning passed her girlhood. Pop. (1931),3,283.

LEE OF FAREHAM, VISCOUNT. English politician. Arthur Hamilton Lee was born 8th Nov., 1868, and educated at Cheltenham College. After a course at Woolwich he passed into the army and served therein until 1900. For part of the time (1893–98) he was a professor at the Royal Military Academy, Kingston, Canada. In 1900 he was elected Unionist M.P. for the Fareham division, and from 1903–5 he was Civil Lord of the Admiralty. In 1915 he became Parliamentary Secretary to the Ministry of Munitions, and in 1917–18 he was Director-General of Food Production. In 1919 he was made Minister of Agriculture, and in 1921 he became First Lord of the Admiralty. He resigned in Nov., 1922, having represented Great Britain at the Washington Conference. Since then he has been chairman of important royal commissions and actively connected with Anglo-American and other movements. In 1918 Lee was made a baron and in 1922 a viscount. He inherited the estate of Chequers (q.v.), which, in 1921, he presented to the nation.

LEE, Nathaniel, an English dramatic poet, born about 1653, died in 1691 or 1692. Educated at Cambridge, he afterwards went to London, and in 1675 produced his tragedy of *Nero*, from that time to 1681 producing a tragedy yearly, the best known being *The Rival Queens* (1677). After his failure as an actor he became insane (1684), and was confined in Bedlam, then Bethlehem Hospital, until 1688, when he was discharged and wrote two more tragedies, *The Princess of Cleves* and *The Massacre of Paris*, which appeared in 1689 and 1690.

LEE, Robert Edward, American general, commander-in-chief of the Confederate army, and one of the most skilful tacticians who took part in the great Civil War of 1861–5, was born in Virginia 19th Jan., 1807, died 12th Oct., 1870. In 1829 he left the military academy of West Point with the rank of second lieutenant of engineers. After making a tour in Europe he obtained a captaincy in 1838, and in 1847 was appointed engineer-in-chief of the army for the Mexican campaign, in which his brilliant services at Cerro-Gordo, Contreras, Cherubusco, and Chapultepec (where he was wounded)

Robert E. Lee

speedily gained for him the rank of colonel. From 1852 to 1855 he was superintendent of military studies at West Point.

In 1861 he was in command of the First United States Cavalry Regiment, and, although offered a high command by the Federals, he resigned his commission on the secession of Virginia from the Union. He joined the levies of his native state, being subsequently selected by President Davis as commander-in-chief of the North Virginian Confederate Army (31st May, 1862). In a seven days' battle in June, 1862, he defeated the Federal army under M'Clellan, and, aided by Stonewall Jackson, defeated Pope at Cedar Run, and at Bull Run (30th Aug.), forcing him back upon Washington, and changing the Confederate fortunes from defeat into merited success.

Lee now crossed the Potomac into Maryland to threaten Washington itself, but a series of checks obliged him to withdraw behind the Rappa-

hannock. On the 13th Dec. he routed the Federalists under Burnside at Fredericksburg, and on the 2nd and 3rd May, 1863, gained the splendid victory of Chancellorsville over Hooker. After this Lee resolved to push on to Washington, but was beaten by Meade at Gettysburg, 1st and 3rd July, 1863, and forced to retreat into Virginia. In the autumn of that year he collected all his forces,

John Leech

defeated Meade on 7th Nov., and in May, 1864, advanced upon Fredericksburg, while Grant at the head of a large army entered Virginia.

A series of sanguinary engagements took place at Spottsylvania (5th to 10th May), in which Lee was worsted, but on 3rd June he defeated Grant at Chickahominy. The Federals, however, with their great superiority of men and *matériel*, gradually hemmed in the Confederate forces, and on 9th April, 1865, Lee and his army surrendered to Grant at Burkesville. General Lee then retired into private life, was elected president of Washington College, Lexington, Virginia, in 1865, where he died.—BIBLIOGRAPHY: G. M. Adam, *Life of General R. E. Lee*; T. N. Page, *Robert E. Lee, Man and Soldier*.

LEE, Sir Sidney, Shakespearean scholar and editor of the great *Dictionary of National Biography*, was born in London 5th Dec., 1859, and educated at the City of London School and Balliol College, Oxford.

From 1883 to 1890 he was assistant editor of the *Dictionary of National Biography* (Leslie Stephen being editor,) joint-editor from 1890 to 1891 (the first twenty-six volumes being now issued), and afterwards sole editor, so that under him appeared the remaining volumes, u vol. lxiii, with the six of supplen and one of epitome. In 1901 he appointed Clarke lecturer in Eng literature at Trinity College, C bridge, and in 1903 he lectured several institutions in the Uni States. In the latter year he appointed Chairman of the Execu of Shakespeare's Birthplace Trus

Among his publications are: *St ford-on-Avon from the Earliest Ti to the Death of Shakespeare* (1885) *Life of William Shakespeare* (18 with subsequent editions); *A Life Queen Victoria* (1902); *Shakespe First Folio Facsimile, with Introd tion and Census of Extant Cop* (1902); *Elizabethan Sonnets* (190 *Great Englishmen of the 16th Cent* (1904); *The French Renaissance England* (1910); and *The Principl of Biography* (1911). He died March, 1926.

LEE, Sydney, English artist. Bo in 1866, he studied art in Manches and Paris. He won several prizes his etchings and engravings as well his paintings. His picture "Amo the Dolomites" was bought for t nation and he has pictures in Live pool, Glasgow, and other cities, well as in the South Kensingt Museum. He was elected A.R.A. 1922 and R.A. in 1930.

LEE, William, English invento Born at Calverton, Nottinghamshi about 1560, he was educated at Can bridge. He became a clergyman an was at Calverton from 1582 to 159 While there he invented a frame f knitting stockings more quickly tha they could be knitted by hand. H took it to London and made a succes of it. His concluding days wer passed in Rouen and in Paris, wher he died about 1610.

LEECH, John, an English artist an humorist, born in London in 1817 died 1864. He was educated a Charterhouse, after which he studie at St. Bartholomew's Hospital for time, but forsook medicine, and com menced drawing on wood for pub lications. His first important work was illustrations to the *Ingoldsb Legends*.

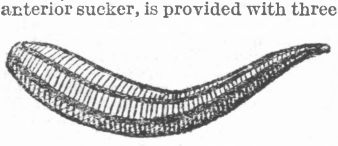
In 1841 he joined the staff of *Punch* his first drawing appearing in August of that year. For that periodical he worked with pre-eminent success, supplying weekly political satires and pictures of all phases of English life, showing no less artistic power than versatile humour, and marked by complete absence of the malice and coarseness often shown in the work of his predecessors. His designs for *Punch* have nearly all been republished as *Pictures of Life and Charac*

, and as *Pencillings from Punch.* also executed the illustrations for *r. Sponge's Sporting Tour, The mic History of England,* and other oks.—Cf. W. P. Frith, *John Leech d his Work.*

LEECH, a name for those Annelida segmented Worms that form the pe of the ord. Hirudinea (synonyms, *ictoria, Discophora*) of that class. ıe distinctive feature of the leeches nsists in the presence of an anterior cker surrounding the mouth, and, most cases, of a posterior sucker as ell. The rings or segments of the ody are divided into numerous nuli. Leeches usually breathe by ıe general surface of the body, but cternal gills are sometimes present. he sexes are united, and the eggs are sually deposited in little cases or ocoons. They chiefly inhabit fresh-ater ponds, though some live among ioist vegetation, and some are iarine.

Species. The familiar horse-leeches (*Hæmopsis gulo*) of freshwater ponds nd ditches are included in this group. 'he land leeches of Ceylon are ter-estrial in habits, living amongst damp oliage and in like situations. They asten on man and beast, and are a erious pest to travellers.

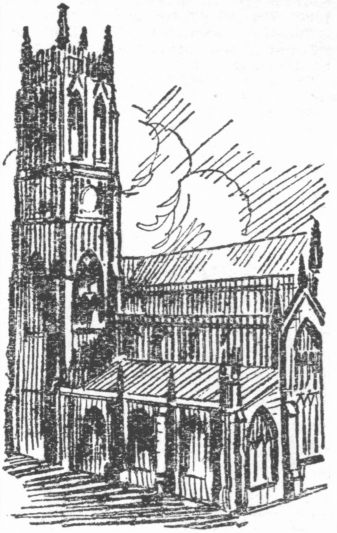
The species generally employed for nedical purposes belong to the genus Hirudo, and are usually either *H. fficinālis* (the Hungarian or green eech), used in the south of Europe, or *H. medicinālis* (the brown-speckled or English leech), used in the north of Europe. The latter variety, however, is now rare in England, owing to the drainage of bogs and ponds. The mouth, situated in the middle of the anterior sucker, is provided with three



Medicinal Leech

small saw-edged jaws, capable of inflicting a peculiar Y-shaped wound, which is difficult to close, and permits a large and continuous flow of blood. Coagulation is prevented by a special secretion that exudes from the mouth. From 4 drachms to 1 oz. may be stated to be the average quantity of blood that can be drawn by a leech. After detaching themselves, leeches are made to disgorge the blood they have drawn by being placed in a weak solution of salt, or by having a little salt sprinkled over them. Leeches appear to hibernate, burying themselves in the mud at the bottom of the pools, and coming forth in the spring.

LEEDS, a city and county borough and manufacturing town of England, in the West Riding of Yorkshire, on the River Aire, which becomes navigable at Leeds, and is crossed by



Leeds Cathedral

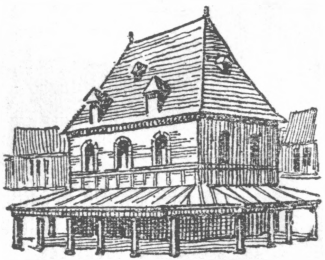
eight bridges. The Leeds and Liverpool Canal, opened in 1816, communicates with the Aire, which again gives water communication with Hull. The canal is about 143 miles long, including branches, and runs through several important towns of Yorkshire and Lancashire.

Buildings, &c. Among the public buildings are the town hall, a massive stone building of the Corinthian order; the infirmary, a building in the Gothic style; the Royal Exchange; the university buildings; and the Institute of Science, Art, and Literature. The chief educational institution is the university (chartered in 1904, previously the Yorkshire College), with faculties of arts, law, science, and technology, and a school of medicine; it has fine buildings including a block erected in 1928–32. The charities and charitable institutions are numerous. Leeds possesses a large public park (Roundhay Park), besides Kirkstall Abbey and its grounds.

Manufactures. Leeds has long been the chief seat of the woollen manufac-

ture of Yorkshire. In the wholesale clothing trade several thousand hands are employed, as also in steelworks, iron foundries, rolling mills, and tool and machine factories. The boot and shoe factories, the leather trade, and the cloth-cap trade also employ large numbers of men and women, and there are extensive colour-printing works, tobacco manufactories, chemical- and glass-works, works for making drainage pipes, fire-bricks, terra-cotta, and pottery. Many collieries are worked in the district.

History. The history of Leeds extends over more than 1,200 years, the town being mentioned under the name of *Loid* or *Loidis*, by the Venerable Bede, as the capital of a small British kingdom about 616. Its



Leeuwarden. The Old Weigh House

present charter is of date 1661. It became a parliamentary borough in 1832, with two members; in 1867 it got a third, in 1885 two more, and since 1918 it has had six. It is now a city, and its mayor is a 'lord mayor.' Pop. (1931), 482,789.

LEEDS, village of Kent. It is 5 miles from Maidstone, and its castle stands on an island in the Medway. The building was formerly a fortress and its gateway and the drawbridge over the moat remain.

LEEDS, DUKE OF, English title borne since 1694 by the family of Osborne. **Sir Edward Osborne** was a London apprentice in the 16th century. He married his master's daughter and became very rich. His grandson, **Edward,** inherited his wealth, including estates in Yorkshire, and was made a baronet. His son, **Thomas Osborne,** was made Earl of Danby in 1674, and Duke of Leeds 20 years later. The titles passed to the duke's son and other descendants. **Francis,** the 5th duke, married the heiress of the Earl of Holderness and obtained Hornby Castle. He was Secretary of State from 1783 to 1789. When the 7th duke died in 1859, the title passed to a younger son of the 5 duke, whose descendant still holds it.

In 1931 the 11th duke sold t family estates, including Horn Castle, which was pulled down. T duke's eldest son is known as t Marquess of Carmarthen.

LEEK (*Allium Porrum*), a mi kind of onion much cultivated f culinary purposes. The stem is rath tall, and the flowers are disposed large compact balls, supported purple peduncles. *See* ALLIUM.

LEEK, a market town of Staffor shire, England, picturesquely situate in the valley of the Churnet, 28 mil from Manchester. There are remair of an ancient abbey and the neigl bourhood has furnished interestin relics of Roman and pre-Roma times. Pop. (1931), 18,556.

LEER (lār), a Prussian town i East Friesland, situated on the Rive Leda, about a mile from where i enters the Ems. It has a good harbour and is also a railway junction. Pop 14,000.

LEES, urban district of Lancashire just outside Oldham, on the L.M.S Rly., 180 miles from London. Th chief industry is cotton manufacture Pop. (1931), 4,738.

LEES-SMITH, Hastings Bertrand, English politician. He was born in India in 1878, and educated at Aldenham School and for the army at Woolwich, but he abandoned a military career and graduated at Queen's College, Oxford. He became known as an economist, and was connected with Ruskin College, Oxford, and the London School of Economics. In 1910 he was elected M.P. for Northampton, and he sat in the House of Commons as a Liberal until 1918. In 1922 he joined the Labour Party, and was elected M.P. for the Keighley division, but lost his seat in 1931. In 1929 Lees-Smith was made Postmaster-General in the Labour Ministry, and in 1931 he was for a few months President of the Board of Education. He resigned office in Aug., 1931, and in Oct. lost his seat in Parliament.

LEET, or **COURT LEET,** an old English court held periodically in a hundred, lordship, or manor, presided over by the steward of the leet, and attended by the residents of the district. In theory it was a royal court, and is thus to be distinguished from the 'court baron.' It began to lose its importance in the fourteenth century.

LEEUWARDEN (lā'-lu-vär-den), a town of the Netherlands, capital of the province of Friesland, intersected by numerous canals. The industrial

establishments are varied. Pop. (1932), 48,901.

LEEUWENHOEK, Anthony van, born at Delft, Holland, in 1632, and died there in 1723. A pioneer observer in biology, he is said to have done most of his work with simple magnifying lenses, which he made himself.

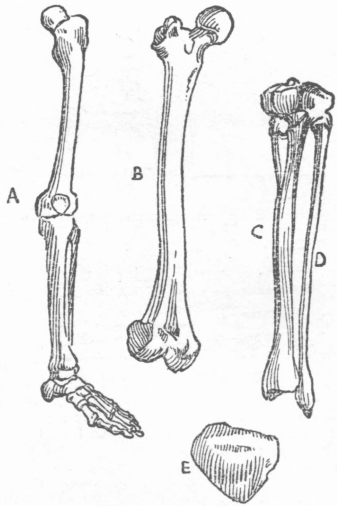
LEEWARD ISLANDS, a double chain in the West Indies, forming, with the Windward Is. (q.v.), the Lesser Antilles. The outer chain comprises Sombrero, Virgin Is. (partly U.S.A.), Anguilla, Barbuda and Antigua (all British), St. Bartholomew, Désirade and Marie Galante (all French), and St. Martin (Dutch and French). The inner chain comprises Dominica, St. Kitts, Nevis, Montserrat (all British), Guadeloupe and Martinique (both French), and Saba and St. Eustatius (both Dutch). Total area, 750 sq. miles; pop. 130,000.

The British Leeward Islands (consisting of five presidencies, Antigua, St. Christopher or St. Kitts and Nevis, Dominica, Montserrat, and the Virgin Islands) form a colony, area 715 sq. miles, with the seat of government at Antigua, and a pop. of 127,829. The chief products of the group are sugar, molasses, sea-island cotton, limes and lime tree products, oranges, timber, and tobacco. *See* WEST INDIES and articles on various islands.

LEG, any limb of an animal that is used in supporting the body, and in walking and running; in a narrower sense that part of the human limb from the knee to the foot. The human leg has two bones, the inner called the *tibia* or shinbone, the outer called the *fibula* or clasp-bone. The tibia is much the larger of the two, and above supports the thigh-bone at the knee-joint, the fibula being attached to the outer side of its head. In front of the knee-joint, situated within a tendon, is the knee-cap or *patella*. (*See* KNEE.) The lower end of the tibia and of the fibula take part in the formation of the ankle-joint, the weight being conducted to the foot by the tibia. (*See* FOOT.) In the front are muscles which extend the foot, and on the back of the leg are two large muscles forming the bulk of the calf of the leg, which unite in a thick tendon, the *tendo Achillis*. These muscles are used in walking, jumping, &c.

LEG'ACY, a gift of personal property by will. It is a general rule that if a legatee die in the lifetime of the testator, the legacy lapses and falls into the residue of the estate, unless when the legatee has been a child of the testator, and has left children. If it is of a particular thing, as a gold watch or so many shares in a particular company, it is *specific*; if of a sum of money to be paid out of the general estate, it is *general*; and if of a sum of money to be paid out of a particular fund, it is *demonstrative*. Legacy duty (q.v.) is payable on most legacies. If the testator after making the bequest of a specific legacy parts with the subject of it, the legacy is revoked or 'adeemed.' All legacies are postponed to the claims of creditors.

LEGACY DUTY is payable on gifts of personal or movable estate made by a testator domiciled in the United



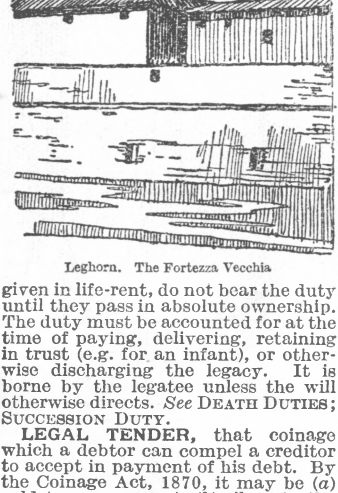
Bones of Human Leg. A, Leg. B, Femur. C, Tibia D, Fibula. E, Patella

Kingdom, and on the distributive shares of such estate devolving under the intestacy of a person so domiciled. The rates vary according to the relationship to the testator or intestate, and are: 1 per cent in the case of husband or wife and lineal ascendants and descendants; 5 per cent in the case of brothers and sisters and their descendants and their wives or husbands; and 10 per cent in the case of all other relatives and strangers.

The 1 per cent duty is not payable (1) where the principal value of the property passing on the death in respect of which estate duty has been paid does not exceed £15,000, and (2) where the amount or value of the legacy together with any other legacies derived by the same person from the

testator or intestate does not exceed (*a*) £1,000, or (*b*) if the person taking the legacy is the widow or child under twenty-one of the testator or intestate, £2,000, whatever the principal value of the property may be.

Exemptions from all legacy duties are *inter alia* objects of national interest, specific legacies under £20 in value, personal or movable estate not exceeding £100, and estates not exceeding £1,000 net value (exclusive of property settled otherwise than by the will of the deceased) upon which estate duty has been paid. Furniture and other things not yielding income,



Leghorn. The Fortezza Vecchia

given in life-rent, do not bear the duty until they pass in absolute ownership. The duty must be accounted for at the time of paying, delivering, retaining in trust (e.g. for an infant), or otherwise discharging the legacy. It is borne by the legatee unless the will otherwise directs. *See* DEATH DUTIES; SUCCESSION DUTY.

LEGAL TENDER, that coinage which a debtor can compel a creditor to accept in payment of his debt. By the Coinage Act, 1870, it may be (*a*) gold to any amount, (*b*) silver to the extent of £2, (*c*) bronze to the extent of 1*s.*, and also (*d*) for debts exceeding £5 Bank of England notes (except for payments by the bank and in Scotland and Ireland). From 1914 to 1928, when they were replaced by Bank of England notes, the £1 and 10*s.* Treasury Notes, issued at first as an emergency war measure, were tender to any amount. Foreign coins are not valid tender in the United Kingdom.

LE'GATES, persons sent by the Pope as ambassadors to foreign courts. Legates *a latere*, the highest in rank, were sent on particularly important missions, and were taken from t college of cardinals only. Legates lower ranks are the *legati missi*, a *legati nati*. The *legati missi* or nunci correspond to ambassadors or mi sters maintained by secular states foreign capitals.

LE'GEND (Lat. *legenda*, to be rea from *legere*, to read), originally t title of a book containing lessons re daily in the services of the ear Church, and afterwards applied collections of biographies of saints an martyrs or of traditional stories them, because they were read in t refectories of cloisters and at matin The Roman breviaries contain hi tories of the lives of saints an martyrs, which were read on th days of the saints whom they com memorated.

Legends were presented in a tan gible form in the twelfth or thir teenth century, and the best-know thirteenth-century work, is probabl *The Golden Legend* (Aurea Legenda) written by Jacobus de Voragine Archbishop of Genoa (died 1298). The *Lives of the Saints* was known a *Legenda Sanctorum*, but the most com prehensive biographical works on the saints is that compiled by the Bollandists in the seventeenth and eighteenth centuries, the *Acta Sanctorum*.—BIBLIOGRAPHY: H. A. Guerber, *Myths and Legends of the Middle Ages*; L. J. A. Maury, *Croyances et légendes du moyen âge*; A. R. Hope Moncrieff, *Romance of Legend and Chivalry*.

LEGENDRE (lē-zhăn-dr), **Adrien Marie,** mathematician, born at Paris in 1752, died 10th Jan., 1833. Educated in the Collège Mazarin, he early became professor of mathematics in the École Militaire, Paris, and in 1783 a member of the Academy. In 1787 he was employed along with Cassini and Mechain to measure a degree of latitude between Dunkirk and Boulogne, while English mathematicians did the same on the other side of the Channel.

His best-known work is his excellent *Eléments de Géometrie* (1794), a substitute for Euclid which has been much used on the Continent. *Legendre's coefficients*, now called Zonal Harmonics, were introduced by him, and applied to the theory of attraction. He wrote a great work on Elliptic Functions, containing his own researches on Elliptic Integrals, as well as the later developments of Abel and Jacobi. He made discoveries of the first importance in the theory of numbers, and his treatise on the subject is a classic.

LEGHORN (It. *Livorno*), a seaport of Northern Italy, capital of the province of Leghorn or Livorno. Leghorn

is for the most part modern, and from a tiny place of about 700 inhabitants (sixteenth century) it has become the most important commercial town of Italy after Genoa, and contains the only naval college (Accademia Navale) of that country. It is intersected by canals, and a navigable canal connects it with the River Arno.

Among objects of interest are the Duomo or Cathedral; the church of the Madonna; a synagogue richly ornamented with marbles; the English chapel and cemetery (containing Smollett's tomb); and the lazarettos, particularly San Leopoldo, one of the most magnificent works of the kind in Europe.

The manufactures are varied. Shipbuilding is important, and trade is principally carried on with the ports of the Levant and with the United Kingdom, the exports being oils, silks, wines, hides, marble, and mercury.

History. Leghorn was a mere fishing-village when it came into the possession of the Florentines in 1421, and it continued to be a place of no importance till the sixteenth century, when, in 1551, the Medicis extended an invitation to all classes and creeds upon the Continent to settle in Livorno. The town was extended, fortified, and proclaimed a city in 1605.

The Fort Vecchio still guards the entrance to the harbour. The harbour was commenced in 1586 and completed in 1621, when Livorno was declared a free port. The modern double harbour was completed in 1855, and is protected by a modern mole. There is a seventeenth-century cathedral with a façade designed by Inigo Jones. Pop. (1931), 124,391.

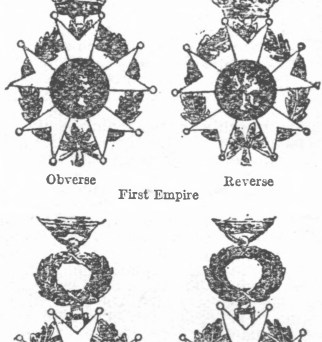
LEGHORN FOWL. *See* POULTRY.

LEGION (Lat. *legio*, from *legere*, to gather or collect), in ancient Roman armies a body of infantry consisting of different numbers of men at different periods, 3,000 at first, 4,200 under Servius Tullius, 6,000 from the time of Marius onwards, and frequently with a small cavalry auxiliary. Each legion was divided into ten cohorts, each cohort into three maniples, and each maniple into two centuries. Every legion had sixty centurions, and the same number of *optiones* or lieutenants and standard-bearers. The standard of the legion was a silver eagle, introduced by Marius.

LEGION, FOREIGN. *See* FOREIGN LEGION.

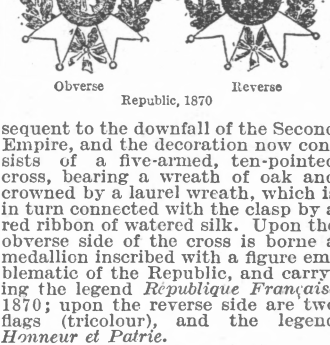
LEGION OF HONOUR (*Légion d'Honneur*), a French order for the recognition of military and civil merit, instituted by Napoleon while he was First Consul, 19th May, 1802, and inaugurated 14th July, 1804. The decoration as worn by Napoleon consisted of a cross containing his portrait surrounded by a wreath of oak and laurel, surmounted by the imperial crown, and bearing the legend *Napoléon Empereur des Français*; on the reverse was the French eagle with a thunderbolt in his talons, and the legend *Honneur et Patrie*.

The order has been remodelled upon several occasions, the last being sub-



Obverse Reverse

First Empire



Obverse Reverse

Republic, 1870

sequent to the downfall of the Second Empire, and the decoration now consists of a five-armed, ten-pointed cross, bearing a wreath of oak and crowned by a laurel wreath, which is in turn connected with the clasp by a red ribbon of watered silk. Upon the obverse side of the cross is borne a medallion inscribed with a figure emblematic of the Republic, and carrying the legend *République Française* 1870; upon the reverse side are two flags (tricolour), and the legend *Honneur et Patrie*.

The head of the Republic is Grand Master of the order, which is now divided into five classes, Grand Cross, Grand Officer, Commander, Officer, and Chevalier, the numbers of appointments in all cases being limited. During the European War several French and Belgian towns were decorated with the Legion of Honour; women are

eligible for appointment, as are also foreigners.

LEGISLATION is one of the two main elements in government. The legislator is the one who 'carries' laws (Lat. *legis lator*, the bringer of the law). The legislature frames the laws of a country; the administration applies them. The latter function is divided between the judiciary and the executive, concerned respectively with the definition and the detailed application of legislation with reference to the daily life of society.

In modern States the functions of legislation and administration are separated, the former being allotted to elected representatives of the people, while the latter is carried out by a permanently appointed and paid staff of public servants. The element of popular representation distinguishes the modern democratic form of parliamentary government from the monarchic or oligarchic absolutism of past ages. Under the absolute rule of a monarch or an oligarchy the difference between legislation and administration is not distinctive; the edicts of the ruler are in effect administrative rules, whether based on the advice of a council or issued spontaneously.

The distinctive quality of legislation, as understood in modern times, has its genesis with its control by popular representatives. Under a constitutional monarchy the framing of the laws is the work of the representatives of the people, but the act which creates new laws is the 'sanction' of the monarch. The same result is obtained negatively under a republic by the right of veto vested in its president. In practice the ruler's advisers usually initiate legislation; the draft law is considered and amended by one or two chambers of more or less real representatives of the people, and it then passes to the ruler for acceptance or rejection in its final form. Although the ruler's veto theoretically exists under the British constitution it has rarely been evoked and never in modern times: in the United States, on the other hand, the veto of the President is frequently exercised on legislation contrary to the policy of the Administration.

An important auxiliary of legislation is *codification*, or the drawing up of orderly systems of law. This may either be legislation pure and simple i.e. the framing of fresh laws, but in an orderly and connected 'code'), as the Mosaic law or the codes of Solon and Draco, or the digesting of existing law, as the *codices* of Theodosian and Justinian, and, to come to our own day, the many Consolidating Acts of Parliament, or of common (unwritten) law, as the Pandects of Justinian.

The *Code Napoléon* and the Prussian *Landrecht* were in large measure fresh legislation, though based on the existing French and Prussian law respectively. Codes such as the Mosaic and Draconian were no doubt based on existing custom, their merit being the definition and stereotyping of it. This would be the main function performed in the law-giving of the Druids in Britain and the Brehons in Ireland.

The Roman emperors reduced the then existing legislative bodies, the Senate (or council of elders) and Comitia (assembly of the people), to a consultative capacity, and until the close of the Middle Ages legislation remained a function of the prince or ruler, uncontrolled by any popular representative body. The legislative power was the last to be acquired by the British Parliament, being preceded by the control over taxation and the right to impeach the king's ministers for misconduct. It was not until the nineteenth century that representative legislatures were secured in the European States; they were everywhere modelled closely on the British Parliament.

In some States, notably in Switzerland, Esthonia, and in certain state Governments of the United States, and of Australia, the system of the Initiative and the Referendum is in force. Under this system legislation may be directly initiated by the people, and completed drafts of some or all laws must be submitted to popular vote (referendum) for sanction or veto, and must be submitted if a certain percentage of voters so demand. Draft legislation may be promoted by a petition with a prescribed minimum of signatures; this is Initiative. The petition, if not acceded to, must be referred to a popular vote, and if popular approval is thus manifested, the proposed law must be carried into effect by the legislative chamber.

The limits between legislation and administration vary a good deal in different countries. In Great Britain it is usual to draft Acts of Parliament in great detail, regulations issued under them being concerned mainly with the duties of the departments entrusted with their administration. In recent times there has been a tendency to give ministers power to issue regulations and orders in council, and this tendency has been criticised as a usurpation of legislative authority.

In some of the European States, notably France, Germany, and Italy, laws are frequently promulgated in

ich more general terms, leaving der scope to the administration in ling in details and even in supple- enting the legislative provisions; ways subject, however, to the right the legislative bodies to amend or peal the administrative ordinances. his method of legislation is open to ouse where the administration is not osely watched and controlled, but it ives the time of the legislative ambers, and ensures a greater exibility, which is important in gislation dealing with complicated nd changing social problems. Ac- ordingly there was a strong move in his direction in British practice uring the European War, since hen, however, a reaction against Government by Bureaucracy' has et in.—Cf. W. T. Brown, *Underlying Principles of Legislation.*

LEGISLATURE, the authority in a State vested with the power of making laws. Such a body may be (*a*) sovereign, or (*b*) non-sovereign or subordinate.

(*a*) The outstanding example of a sovereign legislature is the Parliament of the United Kingdom, which is both a legislative and a constituent assembly, i.e. the king in Parliament may make, alter, or repeal any law, whether affecting public or private rights or the Constitution, with equal facility, and cannot be limited or over- ruled by any person or body. In the words of Blackstone: "The power and jurisdiction of Parliament is so transcendent and absolute that it cannot be confined either for causes or persons within any bounds. . . . It hath sovereign and uncontrollable authority in the making, confirming, enlarging, restraining, abrogating, repealing, reviving, and expounding of laws, concerning matters of all possible denominations, ecclesiastical or temporal, civil, military, maritime, or criminal, this being the place where that absolute despotic power, which must in all Governments reside some- where, is entrusted by the Constitu- tion of these kingdoms. All mischiefs and grievances, operations, and remedies, that transcend the ordinary course of the laws are within the reach of this extraordinary tribunal. It can regulate or new-model the succession to the crown. . . . It can alter the es- tablished religion of the land. . . . It can change and create afresh even the Constitution of the kingdom and of Parliaments themselves. . . . It can in short, do everything that is not naturally impossible. . . . True it is that what the Parliament doth, no authority on earth can undo."

(*b*) A non-sovereign or subordinate legislature, on the other hand, is restricted in its legislative powers in some way, as by the existence of a Constitution from which it derives its authority and which it cannot change, or which it can change only by extra- ordinary difficulty; or by the existence of an independent authority which may pronounce its laws invalid or unconstitutional. Examples are the legislatures of France, Belgium, and other countries, and of the British Dominions, which have a high degree of sovereignty, and those local bodies with more limited powers (municipal corporations, railway companies, &c.) which are not ordinarily called legis- latures. Thus the British Dominion Parliaments make and repeal laws, but they have no power to alter the Imperial Statutes which gave them their constitutions, nor is any Domin- ion Statute valid which conflicts with an Imperial Statute applying to that Dominion. Legally the Imperial Parliament can legislate for the Dominions, and the Crown can veto Dominion legislation; in practice, of course, the self-governing Dominions enjoy virtually complete legislative and administrative autonomy. In the United States of America Congress may pass laws to which the courts will not give effect as being in contraven- tion of the Constitution. In a federal Constitution the legislative bodies of the individual States are necessarily non-sovereign bodies bound by the terms of the treaty which forms the federal Constitution. Of the law- making bodies not ordinarily termed legislatures, a railway company may be taken as an example. It can make by-laws regulating its affairs, e.g. con- ditions of travelling, but only within the limits of the Act constituting it and not repugnant to the general laws of the land.—BIBLIOGRAPHY: A. V. Dicey, *Law of the Constitution*; Sir C. P. Ilbert, *The Mechanics of Law Making*; Sir W. R. Anson, *Law and Custom of the Constitution.*

LEGITIM (lej'), or **BAIRN'S PART,** in Scots law, the share of a father's movable property to which on his death his children are entitled. This amounts to one-third where the father has left a widow, and one-half where there is no widow. The legitim cannot be diminished or affected by any testamentary or other *mortis causa* deed. It may be discharged by ante- nuptial contract of the parents, or satisfied by a testamentary provision given and accepted in lieu of it. By a statute passed in 1881 legitim is also made payable out of the mother's movable estate.

LEGITIMATION, the act whereby a bastard is made legitimate. Legitima- tion may be accomplished in three ways: by subsequent marriage of the

parents (*per subsequens matrimonium*) provided that at the date of the child's birth neither of the parents was married to a third person, and that the father at the time of the marriage was domiciled in England or Wales. This (except as to domicile) was the law in Scotland but not in England till the passing of the Legitimacy Act, 1926.

A child so legitimated is given the status and right of one born legitimate, and if thereafter there should be issue of the marriage, he will be the eldest, and entitled to succeed as such. But if an illegitimate child dies before his parents marry their subsequent marriage legitimates him only so far as regards his children's rights of succession.

If the father of an illegitimate person is domiciled, at the time of his marriage to the mother, in a country other than England or Wales (including Scotland and His Majesty's dominions) by the law of which legitimation by subsequent marriage is recognized, the legitimacy of that person, if living, will be recognized in England and Wales as from 1st Jan., 1927, or the date of the marriage, whichever last happens. It is not essential that at the time of the child's birth the father was domiciled in a country where legitimacy by subsequent marriage was recognized. When the right to property depends upon the seniority of children legitimated persons rank as if born on the date of legitimation.

LEGITIMISTS (Lat. *legitimus*, legal, from *lex*, law), a French party which, after 1830, upheld the claims of the elder line of the Bourbons, to which Charles X belonged, against the younger or Orleanist line. The claims of the families of Bourbon and Orléans were eventually (1883) united in the person of the Comte de Paris. The name of legitimists is now applied to the believers in hereditary monarchy as opposed to parliamentary rule.

LEGROS (lė-grō), **Alphonse**, French artist, who worked mainly in England, born near Dijon in 1837, died in London 1911. Among his more important pictures are *The Anglers*, *The Pilgrimage*, *The Spanish Cloister*, *The Benediction of the Sea*, *The Baptism*, and *The Tinker*, this last being now in the Victoria and Albert Museum.

His etchings (well represented in the British Museum) will prove in all probability his most enduring work, among the most noteworthy being his *Death and the Woodman* and *Le Repas des Pauvres*, both marked by breadth in conception and treatment. His portraits are also of considerable interest and value. As a teacher he exercised great influence. His work is marked by simple and direct tec nique, and sincere, rather seve handling; qualities which re-appe in many of his pupils.

LEGUMINO'SÆ, one of the large and most important natural orders plants, including about seven thousar species, which are dispersed throug out the world. They are trees, shrub or herbs, differing widely in habi with stipulate, alternate (rarely opp site), pinnate, digitately compound simple leaves, and axillary or termin one- or many-flowered peduncles often showy flowers, which are suc ceeded by a leguminous fruit. Thre sub-orders are recognized: Papilion aceæ Cæsalpinieæ, and Mimoseæ It contains a great variety of use ful and beautiful species, as peas beans, lentils, clover, lucern, sainfoin vetches, indigo, logwood, and many other dyeing plants, acacias, senna tamarinds, &c.

LEH, the chief town of Ladakh province, Kashmir, in a fine oper valley about 11,000 feet above sea level, and 2 miles from the right bank of the Indus, 210 miles north of Simla. The Rajah's palace and several local temples are of very rich architecture. Leh is the great entrepôt for the traffic between the Punjab, Chinese Turkistan, and Lhasa, the population being about 3,000.

LEHAR, Franz, Hungarian composer, born 30th April, 1870, after studying at Vienna and Prague he became a conductor, producing his first opera, *Kukuska*, subsequently called *Tatiana*, in 1896. His charming melodies and waltzes have earned him great popularity, and among his successes may be mentioned *The Merry Widow*, *Paganini*, *Gypsy Love*, *Frederica*, and *The Land of Smiles*.

LEIBNITZ (līb'nits), **Gottfried Wilhelm, Baron von**, German scholar and philosopher, born in 1646 at Leipzig, died in 1716. He studied law, mathematics, and philosophy at the university of his native town, where he published a philosophical dissertation, *De Principio Individui*, as early as 1663. This was followed by several legal treatises, for example, *De Conditionibus* (1665), and by a remarkable philosophico-mathematical treatise, *De Arte Combinatoria* (1666).

After holding political appointments under the Elector of Mainz he went to Paris in 1672, and there applied himself particularly to mathematics. He also went to England, where he was elected a member of the Royal Society, and made the acquaintance of Boyle and Newton. About this time he made his discovery of the differential calculus. The Duke of Brunswick-Lüneburg then gave

him the office of councillor and a pension, and after a further stay in Paris he returned to Hanover in 1676, and entered upon the superintendence of the library.

For the rest of his life he served the Brunswick family, chiefly residing at Hanover, though visiting also Berlin, Vienna, &c. Being commissioned to write the history of the House of Brunswick-Lüneburg, Leibnitz went (1687) to Vienna, and thence to Italy. About this time he proposed a scheme to reunite Protestants and Catholics. Having assisted the Elector of Brandenburg (afterwards Frederick I of Prussia) to establish the Royal Academy of Sciences at Berlin, he was made president for life (1700). He was also made a Privy Councillor by Tsar Peter the Great.

In 1710 he published his celebrated *Essai de Théodicée*, on the goodness of God, human liberty, and the origin of evil, in which he maintained the doctrines of pre-established harmony and optimism, and which was followed by his *Nouveaux Essais sur l'Entendement humain*. A sketch of his philosophy was given by him in his *Monadologie*, 1714. Severe attacks of gout, and his controversy with Newton concerning the discovery of the differential calculus, embittered the close of his active life.

Although Leibnitz was eminent in various branches of knowledge, he is famous chiefly for his philosophical and mathematical achievements. Greatly influenced by the philosophy of Descartes, he differed from the latter both in method and in some principles. The principal metaphysical speculations of Leibnitz are contained in his *Théodicée*, *Nouveaux Essais*, *Système nouveau de la Nature*, *De Ipsa Natura*, *Monadologie*, and in portions of his correspondence. He controverted Locke's rejection of innate ideas, holding that there are necessary truths which cannot be learned from experience, but are innate in the soul, not, indeed, actually forming objects of knowledge, but capable of being called forth by circumstances. For his theory of monads, *see* MONAD.

Authorities seem generally agreed that Leibnitz discovered the differential calculus independently of any knowledge of Newton's method of fluxions. — BIBLIOGRAPHY: J. F. Nourrisson, *La Philosophie de Leibnitz*; F. Kirchner, *G. W. Leibnitz*; B. A. W. Russell, *Critical Exposition of the Philosophy of Leibnitz*.

LEICESTER, Robert Dudley, Earl of, fifth son of John Dudley, Duke of Northumberland, born (*circa*) 1532, died 1588. In 1549 he was married to Amy Robsart, daughter of a Devonshire gentleman, and is said to have been accessory to her murder in 1560. He had been knighted by Edward VI, and Elizabeth created him Earl of Leicester and Privy Councillor, and bestowed titles and estates on him lavishly, but he excited the violent anger of the queen by his marriage with the Countess of Essex in 1578. He is characterized as an ambitious and unscrupulous courtier. The earldom lapsed with his death.

LEICESTER (les-tĕr), a city, municipal, parliamentary, and county borough of England, stands on the Soar near the centre of Leicestershire. The more important public build-

Leicester, part of the castle ruins

ings are the church of All Saints; St. Margaret's, a large and beautiful structure of the fifteenth century on the site of the old Saxon cathedral, and adjoining the abbey of St. Mary at which Cardinal Wolsey died in 1530; St. Martin's; St. Mary's, dating from twelfth century; St. Nicholas's, a very ancient Gothic church; the municipal buildings, with lofty clock-tower, and fine public square with fountain; the guild-hall, once the hall of a Corpus Christi guild, and town hall till 1876; the public library; and Trinity Hospital (1330).

The staple manufactures are cotton and worsted hosiery, elastic webs, iron-ware, boots and shoes, shawls, lace, and thread.

Leicester is a place of considerable antiquity, and was known to the Romans, who established a camp there in A.D. 50, under the name of *Ratæ Coritanorum*. The Saxon name was *Legerceastre*. It was made a city in 1919, and in 1927 became the seat of a bishop. In 1928 its mayor was given the title of Lord Mayor. It sends three members to Parliament. Pop. (1931), 239,111.

LEICESTERSHIRE, a county of England, in the Midlands; area, 532,779 acres. The surface is varied and uneven, but possesses no bold features. The county is nearly equally divided geologically by the lias and sandstone formations; the former on the east, the latter on the west side. The coal formation exists to the extent of about 15 sq. miles on the west and the clay-slate in Charnwood Forest (deforested), an elevated area where Bardon Hill rises some 900 feet. The principal rivers, all tributaries of the Trent, are the Soar, Wreak, Anker, Devon, and Mease. Dairy-farms are numerous,

Lord Leighton

and Stilton cheese is extensively made. The Leicestershire sheep are much valued for their wool. The county returns four members to Parliament. Principal towns besides Leicester—Loughborough, Market-Harborough, Melton-Mowbray, and Hinckley, the first three being well-known fox-hunting centres. Pop. (1931), 541,794.

LEIGH, a borough of England, county of Lancashire, 12½ miles west of Manchester. It has manufactures of cottons, silks, glass, ironware, agricultural implements, &c., and near it are extensive collieries. Pop. (1931), 45,313.

LEIGH-ON-SEA, a watering-place in Essex, England, on the Thames, now a ward of Southend. Oyster-rearing is important.

LEIGHTON (lā'ton), **Frederick,** Lord Leighton, painter, President of the Royal Academy, born at Scarborough in 1830, died in 1896. From Rome, where he spent some three winters, he sent to the Royal Academy of 1855 his picture of *Cimabue's Madonna carried in Procession through the Streets of Florence,* which was presented to the Scottish nation by King George V in 1922. For four subsequent years he resided at Paris, and then finally took up residence in London.

In 1864 he was elected an associate of the Royal Academy, and in 1869 an Academician. In 1878 he succeeded Sir Francis Grant as President of the Academy, was knighted, and was named an officer of the Legion of Honour. In 1886 he was made a baronet, and on 1st Jan., 1896, he was made a peer.

Works. From the long list of his works special mention may be made of his *Hercules Wrestling with Death* (1871), *The Daphnephoria* (1876), *Phyrne* (1882), *Cymon and Iphigenia* (1884), and *Ball Players* (1889); and the large frescoes at the South Kensington Museum, representing the *Industrial Arts applied to War, and the Arts of Peace.*

In addition to his pictures he has achieved a high place as a sculptor by his *Athlete strangling a Python* (1876) and his *Sluggard* (1886). He also executed some black-and-white illustrations, notably to George Eliot's *Romola.* The special merit of his work lies in the correct though cold draughtsmanship and in its balanced, harmonious design. His colour, though not without charm, is never really satisfactory except in mural decorations. **Leighton House,** his home in Kensington, containing many examples of his work, is preserved and is in the possession of that Royal Burgh.

LEIGHTON, Robert, Archbishop of Glasgow, born in 1611, died in London 1684. On the attempt at the accession of Charles II to establish Episcopacy in Scotland, Leighton accepted reluctantly the bishopric of Dunblane, in the hope of moderating the violent dissensions of the time. He twice visited London (1665 and 1669) to implore the king to moderate the zeal of Sharpe and Lauderdale, and accepted translation to the archbishopric of Glasgow in 1669 after a promise of court assistance in the attempt to carry out a liberal measure for the comprehension of the Presbyterians. The promise being broken, he resigned his see (1674), and subsequently resided for the most part at his sister's estate in Sussex.

LEIGHTON BUZZARD, market town and urban district of Bedfordshire. It stands on the Ousel, 37½ miles from London, on the L.M.S. Rly. There is a beautiful market cross and an old school. The town lives chiefly

on its agricultural trade. Pop. (1931), 7,031.

LEINSTER (lin'stĕr), a province of Ireland, in the Irish Free State, divided into twelve counties—Wexford, Kilkenny, Carlow, Wicklow, Dublin, Kildare, Leix (Queen's County), Offaly (King's County), Westmeath, Longford, Meath, and Louth; area, 7,624 sq. miles. Leinster is the most favoured of the four provinces of Ireland in the extent of its tillage and pasture lands, and its wealth in minerals. Pop. (1926), 1,149,092.

LEIPA, Böhmisch-Leipa, town of Czechoslovakia, in Bohemia; on the Polz. There are railway workshops and extensive manufactures. Pop. about 9,000.

LEIPOA (lī-pō'a), a genus of gallinaceous birds of the family Megapodiidæ, of which the only species is the *Leipoa ocellăta* of the naturalists, the *ngow-oo* of the aboriginal Australian, and the 'native pheasant' or mallee bird of the colonists. The bird is a native of South and West Australia, is of the size of a very small turkey, and, like the Australian brush turkey, constructs mounds in which to lay its eggs.

LEIPZIG, a city of Saxony, important commercial centre and one of the greatest book-publishing, type-founding cities of Europe. It originated in Lipa (lime tree), a Wendish fishing-village of the tenth century, and is first mentioned as a town in 1015. Its pre-eminent position in the book trade dates from the seventeenth century.

During the eighteenth century Leipzig was the focus of a literary movement under Gottsched, and it suffered greatly during the Napoleonic wars. A monument in the Johannisplatz commemorates the *Völkerschlacht* or 'battle of the nations,' the German term for the battle of Leipzig, in which Napoleon was defeated (1813). In 1879 the *Reichsgericht,* supreme court of Imperial Germany, was established in a grandiose pile within the town, where a few German officers accused of violating the laws of war were tried in 1921. Leipzig possesses the largest railway station in Europe, and a university, founded in 1409.

Until 1829 the Königshaus (seventeenth century) was the palace of the ruling Saxon princes. Two annual fairs have been held by the city since 1170, and, although much injured by modern commercial progress, they are still unique as the Mecca of European bibliophiles. Leipzig has a broadcasting station (259 m., 2 kw.), and two airports. Pop. (1925), 684,728.

LEISTON, urban district of Suffolk, 4 miles from Saxmundham on the L.N.E. Rly. The main industry is agricultural and the chief object of interest the abbey ruins. Pop. (1931), 4,184.

LEITH (lēth), the port of Edinburgh, in the county of Midlothian, Scotland, about 1½ miles from the centre of Edinburgh, on the south shore of the Firth of Forth, on both sides of the Water of Leith. It is connected with Edinburgh by Leith Walk and other lines of streets, and by branch lines of the railways centring in Edinburgh. Among the principal public buildings are the custom-house, exchange buildings, court-house, Trinity House, and the corn-exchange.

The chief manufactures are ropes, sail-cloth, oil-cake, paints, colours, artificial manures, and there are shipbuilding-yards, iron-foundries, engineworks, flour-mills, oil-mills and refineries, steam sawmills, large maltings, and an ice-factory. The foreign trade is chiefly with the Baltic and the principal French, German, Dutch, and Belgian ports, with which there is a trade in grain and flour. There are extensive wet-docks, and several public graving-docks.

Leith is mentioned for the first time, under the name of Inverleith, in a charter of David I granted in 1128. In 1896 Edinburgh promoted a Bill in Parliament for the inclusion of Leith. This Bill was rejected, but an amalgamation was effected in 1920. Pop. (on inclusion), 81,618.

LEITMERITZ, now **LITOMERICE,** a town of Bohemia, Czechoslovakia, on a height above the Elbe, is the see of a bishop, and contains a fine old cathedral. The industries are mainly connected with brewing. Pop. 15,509.

LEITRIM (lē'trim), a north-western county of the Irish Free State, Connaught, about 51 miles long by 21 miles broad; area, 376,774 acres. Lough Allen, in the course of the Shannon, almost halves the county; the seaward half having a small coastal exit to Donegal Bay; the inland half being traversed by the Shannon and containing the county town, Carrick-on-Shannon. The surface, abounding in small lakes, is somewhat rugged and mountainous in the north, but elsewhere generally flat and in part moorish. In the valleys the soil, resting generally on limestone, is fertile. The principal crops are oats and potatoes. The minerals include iron, lead, and copper, all at one time worked, and coal, still raised to some extent. Pop. (1926), 55,907.

LEIX. *See* QUEEN'S COUNTY.

LEIXOES, the chief harbour of Oporto, Portugal, near the Douro estuary.

LELAND, Charles Godfrey, American author, born at Philadelphia 1824, died in 1903. He studied law, but abandoned it for a literary life. He is best known through his quaint *Hans Breitmann Ballads* in Pennsylvania Dutch, and his works on the language of the gipsies.

LELAND, or **LAYLONDE, John,** an English antiquary, born in London about 1506, died in 1552. He was educated at St. Paul's School, and Christ's College, Cambridge, afterwards studying at Oxford and at Paris. On his return Henry VIII made him his chaplain and librarian, and gave him the title of Royal Antiquary.

In 1533 he was empowered, by a

Lemming (*Myodes lemmus*)

commission under the great seal, to search for objects of antiquity in the archives and libraries of all cathedrals, abbeys, or priories, and spent six years in travelling for this purpose. The great bulk of his collections was ultimately placed in the Bodleian Library in an undigested state. Hearne printed a considerable part, forming *The Itinerary of John Leland,* and *Lelandi Antiquarii de Rebus Britannicis Commentarii.*

LE LOCLE. *See* LOCLE, LE.

LE'LY, Sir Peter, painter, born at Soest, in Westphalia, in 1617 or 1618, died in 1680. Lely or Le Lys was properly a nickname borne by his father, whose family name was Van der Vaes. He was first instructed by Peter Grebber at Haarlem, but came to England in 1641, in the train of William, Prince of Orange, and commenced portrait-painting. He finished portraits both of Charles I and of Cromwell (the latter in the Pitti Gallery, Florence); but it was not until the Restoration that he rose to the height of his fame.

His work satisfied the voluptuous taste of the new court, was in great favour with Charles II, who knighted him, and he painted the portraits the fair and frail ladies of the cou The series of *Beauties,* original eleven in number, but now reduce to nine, contains some of his be work. The Collection is now Hampton Court. Another well-know series is that of the *Flagmen,* twelv in number. The finest of Lely's fe historical works is *Susannah and t Elders,* at Burleigh House.

LE MANS. *See* MANS, LE.

LEMBERG, now **LWOW,** a city Poland (formerly in Austria), an capital of the district of Galicia. Th town was founded in 1259, and was a important Polish city until 1772, whe Galicia was annexed to Austria Lemberg being made the provincia capital. In course of the Europea War the attention of all the Higl Commands was fixed upon Lemberg and a series of the most tremendou battles in history was fought for it possession. Captured by the Russian under Russky (3rd Sept., 1914), Brusilov, the Russian generalissimo, held Lemberg until the great Germa offensive of 3rd June, 1915, which culminated in its evacuation and occupation by Mackensen on 22nd June. The Ukranians captured the town in Oct., 1918, but were driven out by the Poles about a month later. Lemberg is an archbishopric (Roman Catholic), and has a university, founded in 1661. Formerly (under the Austrian régime) Austrian Poland was governed by the Galician Diet, sitting at Lemberg and controlled from Vienna. Pop. (1931), 316,177.

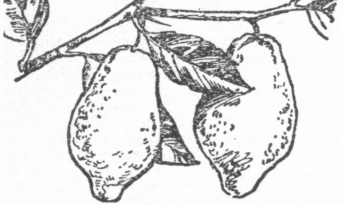
LEMMING, a rodent mammal very nearly allied to the voles. There are several species, found in Norway, Lapland, Siberia, and the northern parts of America.

The most noted species is the common or European lemming (*Myodes lemmus*), of which the body colour is brownish variegated with black; the sides of the head and belly white, or of a greyish tint. The legs and tail are of a grey colour. The head is large and shortened, the body thick-set, and the limbs stout. It feeds on plants, and is exceedingly destructive to vegetables and crops. It burrow under the ground at a limited depth. It is very prolific, and vast hordes sometimes migrate towards the Atlantic and the Gulf of Bothnia, destroying all vegetation in their path. Great numbers of wild animals—bears, wolves, foxes—hang upon them in their march, making them their prey, thus tending to keep their numbers in some degree in check. The banded lemming (*Cuniculus torquatus*) is native to Siberia, Greenland, and North America.

LEMNIAN EARTH, a kind of stringent medicinal earth, of a fatty consistence and reddish colour, used the same cases as bole. It removes impurities like soap. It was originally found in Lemnos, but occurs also in Bohemia, Russia, and India, resulting from decay of felspathic rocks, like kaolin, to which it is related. Called also **Sphragide.**

LEMNOS (*Stalimene*), the most northerly island of the Grecian Archipelago, between the Hellespont and Mount Athos, formerly in possession of the Turks, but occupied by the Greeks during the European War, and annexed by them at the conclusion of peace with Turkey. Mudros Bay, on Lemnos, formed between 1915 and March, 1916, a gigantic base for the combined French and British European and native troops engaged in the campaign of Gallipoli. It has an area of 150 sq. miles. The principal town on the island is Kastro. Lemnos formerly contained a volcano, Mosychlus, which was regarded as the workshop of Hephaistos (Vulcan), Pop. 25,000.

LEMON, Mark, English journalist, humorist, and dramatic writer, born in London 30th Nov., 1809, died at Crawley, in Sussex, 23rd May, 1870. He made his first literary essays in the lighter drama, supplying the London stage with more than sixty pieces—farces, melodramas, and comedies. On the establishment of *Punch*, the first number of which appeared on 17th July, 1841, he became joint-editor with Henry Mayhew, and two years later sole editor.



Lemon

LEM'ON, the fruit of the lemon tree (*Citrus medica*, var. *Limonum*), originally brought from the tropical parts of Asia, but now cultivated very extensively in the south of Europe, especially in Sicily. It is of the same genus as the orange and citron, and differs little from the lime. It is a knotty-wooded tree of rather irregular growth, about 8 feet high; the leaves are oval, and contain scattered glands which are filled with a volatile oil.

The shape of the fruit is oblong, and its internal structure is similar to that of the orange. The juice is acid and agreeable; and besides being used for beverages is employed by calico-printers to discharge colours. It also

Lemurs. Left, Ring-tailed (*Lemur catta*). Right, Grey or broad-nosed (*Hapalemur griseus*)

contains citric acid, sugar, albuminous and some mineral matter, nearly half of which consists of potash.

The **oil of lemon** is a volatile oil of yellow or greenish colour got from the fresh rind of the lemon. It is used in perfumery, and in medicine as a stimulant and rubefacient.

LEMON-GRASS, an Indian grass (*Andropogon schœnanthus*), remarkable for its fragrance, which resembles that of the lemon. From it is obtained grass-oil (q.v.).

LE'MUR, a name popularly given to any member of the Lemuroidea, the lowest sub-order of the Primates, which also include monkeys, apes, and men. The chief family is that of the Lemuridæ, among which the Lemurinæ or True Lemurs are distinguished by their four-footed or quadrupedal mode of progression. The tail is elongated and furry, but is never prehensile. The hind-limbs are longer than the fore-limbs; the second toe in the hind-foot being long and claw-like, and the nails of all the other toes being flat. The fourth digit of the hand, and especially of the foot, is longer than the others. The thumb can always be opposed to the other fingers, and has a broad, flattened nail. The ears are small and

the eyes large. The incisor teeth are generally four, the canines two, and the molars twelve in each jaw. The true lemurs are exclusively confined to Madagascar and the Comoro Islands.

Lemuridæ also embrace: (1) Indrisinæ, a Mascarene sub-family including the short-tailed *Indris brevicaudata* and other forms with disproportionately large hind-limbs; (2) Galagininæ, native to Africa and Madagascar, with large ears and long tails, as in Galago, which ranges over most of Africa; (3) Lorisinæ, small Asiatic forms with very large eyes, and either tailless or with a very short tail. The Mascarene family Chiromyidæ includes only the aye-aye (*Chiromys madagascariensis*), a small creature with a squirrel-like tail and attenuated fingers. A third family, Tarsiidæ, has been constituted for the little spectre lemur (*Tarsius spectrum*), which has large ears, enormous eyes, and suckers on the ends of its digits. All lemurs are arboreal, and their diet is of mixed kind.

LEMURES, among the ancient Romans, synonymous with larvæ, spirits of the dead. To appease them, a ceremony of exorcism was observed on the nights of the 9th, 11th, and 13th May, when the father of the house threw black beans nine times over his head, thus securing one year's immunity from all evil spirits. The ceremony was called *Lemuria.*

LENA, a river of Siberia, one of the largest in the world, rising on the north-western side of the mountains which skirt the western shore of Lake Baikal, about 70 miles E.N.E. of Irkutsk. It flows in a winding course, and discharges itself through a delta into the Arctic Ocean. Its course, windings included, is about 2,900 miles, and, with its tributaries, it has a drainage area of upwards of 900,000 sq. miles. Steamers ply on part of the river.

LENGLEN, Suzanne, French lawn tennis player. Born at Compiègne, 29th May, 1899, she won her first championship when only 14. From 1919 to 1925 she held the Ladies' Singles Championship at Wimbledon, and she won similar honours in France and the U.S.A. In 1927 she became a professional. She has written several books on the game, and her first novel was published in 1925.

LENIN, name taken by the Bolshevist leader, Vladimir Ilyich Ulyanov. He was born 10th April, 1870, the son of a schoolmaster, and was educated at Simbirsk, his birthplace, and then at the Universities of Kazan and St. Petersburg. As a student he was a leader in the demonstrations against authority prevalent at that time. He went to St. Petersburg to study law, and in 189 organized a 'Union for the liberatic of the Working class,' but was exile to Siberia. Released in 1900, he live for a time in Paris and London. H was in Russia during the bric revolution of 1905, after which h resided chiefly in Switzerland; but h lived for a few years in London, wher Leon Trotsky (q.v.) first became asso ciated with him. When war broke ou Lenin was in Galicia, and was arrested but was released. He returned t Switzerland and became active i organising the Socialist peace confer ences of Zimmerwald and Kienthal During these years he was one of the leaders of international socialism.

In 1917 the German Government agreed to an arrangement by which Lenin and other exiles after the first stage of the Revolution were to return to Russia. They passed from Switzerland to Germany in a closed train and reached Petrograd, afterwards Leningrad. Kerensky was then in control of the Government, but Lenin very soon established a complete ascendancy in the Soviet organization. A first attempt to overthrow Kerensky failed. Trotsky, who was by now closely associated with Lenin, was put in prison, while Lenin escaped by flight. With Trotsky released, they renewed their agitation and in Nov., 1917, they succeeded in destroying the authority of Kerensky. The new ideas of government worked out by them during the years of exile were then put into operation. A council of people's commissioners was set up with Lenin as president, and the system known as Bolshevism was established. Peace was signed with Germany and Moscow made the country's capital in March, 1918. Opposition was ruthlessly crushed and the system of Soviet Government (*see* SOVIETS) established by Lenin and Trotsky remained dominant. Closely guarded in the Kremlin, Moscow, Lenin retained his power until his death, 21st Jan., 1924. The Bolshevists honoured his memory by a magnificent tomb. In 1920 Petrograd had been renamed Leningrad.

LENINGRAD, formerly **PETROGRAD** or **ST. PETERSBURG,** the former capital of the Russian Empire, built at the head of the Gulf of Finland and at the mouth of the Neva, the larger portion being on the south or left bank of the river, a small portion on the north bank and the remainder on the islands of the Neva delta (about 100 in number), these various sections being connected by numerous bridges.

The site is low and marshy, and

liable to periodic inundations; it is also unhealthy, the death-rate largely exceeding the birth-rate. The Neva is frozen, on an average, during five months of the year, usually between the end of November and the end of April, but navigation is maintained by the aid of ice-breakers. Leningrad is connected by the Arctic Railway with the Murman coast at Alexandrovsk.

The most important quarter is on the south side of the Neva, and is intersected by three main streets which radiate from the Admiralty on the river bank. These are called Oct. 25th Street (Nevski Prospekt), a magnificent street nearly three miles long and 130 feet wide, the Gorokhavaya, and the Prospekt Voynesenski.

Chief Buildings. Near the Admiralty are the chief public buildings of the city. The principal churches (which are generally distinguished by prominent cupolas) are St. Isaac's Cathedral, built of granite and Finland marble, and with a profusely decorated interior; the cathedral of St. Peter and St. Paul, the resting place of the Romanov emperors (excepting Peter II and Nicholas II), with a conspicuous pyramidal spire (302 feet); the cathedral of Our Lady of Kazan, a cheap copy of St. Peter's in Rome, very badly executed, and one of the ugliest cathedrals of Russia; the Smolni Cathedral; and the Memorial Church, built on the spot where Tsar Alexander II was assassinated, one of the most splendid of the many sacred edifices in the city.

Among the many palaces are the Winter Palace; the old Michael Palace; the new Michael Palace, one of the chief ornaments of the city; and the Hermitage Palace, containing a fine library and one of the richest collections of French, Flemish, Dutch, Italian, Spanish, Russian, and other paintings, formerly the private property of the Tsars, besides engravings, coins, gems, antiquities, &c. The cottage in which Peter the Great lived while superintending the construction of St. Petersburg is still preserved.

Other buildings of importance are: the Admiralty, a vast parallelogram of brick, with a naval and natural history museum and library; the arsenal, containing a museum of artillery; the fortress of Petropavlovsk (the Russian Bastille); the Academy of Sciences, with extensive museum and library; and the old imperial library, with over a million volumes and large collections of manuscripts and engravings. There are numerous hospitals and charitable institutions, a university, founded in 1819, many special academies, and four theatres.

Commerce. St. Petersburg formerly commanded a large share of the commerce of the whole empire, ranking second to Moscow in this respect. The chief exports are timber, eggs, wheat, rye, oats, wheat-bran, mineral oil, oil-cake and mats; the chief imports are coal, coke, patent fuel, metals, raw cotton, tea, herrings, and machinery. Formerly the port of the capital was at the strongly fortified island town of Kronstadt, but vessels are enabled to reach the commodious harbours of Leningrad by means of a ship-canal 18 miles long and 22 to 23 feet deep.

History. St. Petersburg was founded by Peter the Great in 1703, when he had just wrested its site from the Swedes. The forced construction of a city on a site apparently forbidden by nature cost the lives, according to various accounts, of from 100,000 to 200,000 peasants, collected from all parts of the Russian Empire. It was at first built entirely of wood, and without a proper street system, but the extensive fires of 1736 and 1737 facilitated the reconstruction on an improved plan.

The Empress Elizabeth did much to improve the city; it was, however, chiefly indebted to Catherine II for its regularity and architectural splendour; and the improvements under Nicholas and Alexander II made it one of the finest of European capitals. Its commercial prosperity was due to the centralization of an autocratic government, but the main motive for the transference of the capital had ceased to exist for many years through the relief of Moscow from isolation by its connection with the State railway systems, and the restoration of Moscow to its position as capital was repeatedly considered in days before the European War.

Petrograd was the storm-centre of the Russian Revolution (12th March, 1917), and within the city the Republic was proclaimed (Sept., 1917). In November the Soviets occupied the Smolni Institute as head-quarters, and on 14th March, 1918, they transferred the capital to Moscow. Reactionaries several times advanced upon the city, and an outbreak in March, 1921, was supported by many of the Kronstadt garrison. Subsequent to and as a direct consequence of the transfer of the capital, Petrograd was very much neglected, the principal buildings assumed an air of dejected dilapidation. After the death of Lenin in 1924, the name of the city was changed to Leningrad. In 1931 a scheme for rebuilding the city and restoring its prosperity was put forward. The city has now resumed its former commercial position. There are two broadcasting stations (1000 M., 100 kw., and 351 M. 1·2 kw.).

The population in 1913 was 2,318,645; and in 1926 it was 2,228,300.—Cf. W. B. Steveni, *Petrograd, Past and Present*.

LENNOX, district of Scotland. It goes from Dumbarton to Stirling, and includes the county of Dumbarton and parts of the counties of Stirling, Renfrew and Perth. In the district are the Lennox and Kilpatrick Hills and the Campsie Fells. There was an Earl of Lennox in the 12th century, and a later earl was father of Lord Darnley. In 1581 Esme Stuart was made Duke of Lennox, but the title died out in 1672. In 1675 Charles II gave it to an illegitimate son, Charles Lennox, Duke of Richmond, and it has since been held by the dukes of Richmond.

LENNOXTOWN, town of Stirlingshire, 11 miles from Glasgow on the L.N.E. Rly. It is a coal-mining centre and has also textile mills. Pop. 2,590.

LENO, Dan, English comedian, whose real name was George Galvin. He was born 20th Dec., 1860, and won fame as an entertainer by his clog dancing. He was also something of an acrobat. In 1888 he appeared in London in the pantomime at Drury Lane, and for the next 20 years he was perhaps the most popular figure in variety entertainments. His native humour, unique of its kind and quite clean, delighted thousands. Leno died 31st Oct., 1904.

LENS, in optics, a transparent body, usually of glass, with two surfaces ground and polished to shapes which are usually portions of spheres. Ordinary lenses are either convex or concave; convex lenses are thickest in the middle and cause rays of light to converge; concave lenses are thinnest in the middle and cause divergence of light. This action may be inferred from the fact that a ray of light which passes through a prism is bent or refracted towards the base of the prism. A lens may be regarded as built up of a series of prisms; in the convex lens the bases are towards the centre, and this lens bends the rays towards the centre; in the concave lens the bases of the prisms are towards the outside, and rays of light are bent by this lens away from the centre.

With regard to shape, lenses may be further classified as double convex, plano-convex, meniscus convex, and double concave, plano-concave, meniscus concave. Other shapes are used for spectacle lenses, such as cylindrical, sphero-cylindrical, and toric surfaces, the last-named having different curvatures in two directions at right angles (compare the surface of an egg). Taking as an example the double convex lens, the straight line joining the centres of curvature of i surfaces is the *axis* of the lens, a the point on the axis through whi rays may pass without ultima change of direction is the *optic centre*. When rays parallel to the ax are incident on the lens, the emerge rays converge to pass through t *principal focus*, a point on the axi There are two such points, one o each side of the lens, and the distanc of either focus from the optical centr is the *focal length* of the lens. Th *power* of the lens is the reciprocal of it focal length. When a luminous poin is situated on the axis of a conve lens, rays spread out from the point and some of these pass through th lens, and, if convergent, form a poin image on the axis. These two point are *conjugate foci*, and are inter changeable. When the luminous point is at a great distance from the lens, its image is at the principal focus. This is nearly realized when the lens is used to focus the sun's rays, and an image of the sun is formed close to the principal focus. The lens may be used in this way as a burning-glass. If the point object is moved along the axis towards the lens, the image moves along the axis away from the lens.

In some forms of the photographic camera an expansible body is provided, so that the camera may be capable of focusing, on the ground-glass screen, images of objects at different distances from the lens. In the cases given, the image is real and inverted. When the object is at the principal focus, the image is infinitely distant. If the object is moved nearer to the lens than the principal focus, the image is formed on the same side of the lens as the object, and it is now virtual, erect, and enlarged. It is seen by looking through the lens, as is done when using a pocket lens as a simple microscope. The axis and optical centre of a concave lens may be defined as above; the principal focus is, however, virtual, and is that point from which the emergent rays appear to diverge, when rays parallel to the axis fall on the lens. The virtual image which is formed by a concave lens is erect, diminished, and nearer to the lens than the object. Additional information should be sought in textbooks of optics. *See* TELESCOPE; MICROSCOPE; OPTICAL LANTERN; PHOTOGRAPHY; OPTICS.

LENS (lâns), a town of France, department of Pas-de-Calais. It is on a canalised river, 13 miles from Arras, and possesses iron- and steel-foundries and coal-mines, and manufactures steel cables. Here Condé defeated the Spaniards under Archduke Leopold in 1648. During the European War Lens was occupied by the Germans in Oct.,

1914, and was not reoccupied by British troops until 3rd Oct., 1918. Pop. 33,513.

LENT, the forty days' fast in spring, beginning with Ash Wednesday and ending with Easter Sunday. It is called *quaresima* in Italian, and *carême* in French, from the Lat. *quadragesima* (fortieth). In the Latin Church Lent formerly lasted but thirty-six days; in the fifth century four days were added, in imitation of the forty days' fast of the Saviour, and this usage became general in the Western Church. The close of Lent is celebrated in Roman Catholic countries with great rejoicings, and the Carnival is held just before it begins. The English Church has retained Lent and many other fasts, but gives no directions respecting abstinence from food.

LENTHALL, William. English politician. Born in June, 1591, the son of a landowner in Oxfordshire, he was educated at Oxford. He became a barrister and in 1640 was elected M.P. for Woodstock. In 1641 Charles I. appointed him Speaker of the House of Commons, and he retained the office until 1653. Throughout the Civil War Cromwell addressed to him his letters about the campaign. He was speaker again in 1659 when the Rump was recalled. Lenthall was exempted from pardon in 1660 but he was unmolested and he died at his residence at Burford, Oxfordshire, Sept. 3, 1662.

LENTIBULARIACEÆ, a small natural order of gamopetalous dicotyledons, growing in water or in marshy places, sometimes epiphytes. The flowers (often large and handsome) are usually yellow, violet, or blue. There are four genera, of which Utricularia (bladderwort) and Pinguicula (butterwort) are the best known. All are carnivorous.

LENTICELS, ventilating pores which take the place of stomata (q.v.) on stems and other organs covered by cork or bark; well seen in ordinary bottle-cork (the powdery streaks) or twigs of elder.

LENTIL (*Ervum lens*), a plant belonging to the papilionaceous division of the nat. ord. Leguminosæ, cultivated in Southern and Central Europe. It is an annual, rising with weak stalks about 18 inches, and with whitish flowers hanging from the axils of the leaves.

Two varieties are cultivated—the large **Garden Lentil** and the common **Field Lentil**—the former distinguished by its size and the greater quantity of mealy substance which it will afford. The straw of lentils makes good fodder. As food for man the seeds are very nutritious, and in Egypt, Syria, &c., are a chief article of diet. In Great Britain their use as food is extending.

LENTI'NI (Lat. *Leontini*), a town of Sicily, province of Syracuse. It has interesting ruins and a considerable trade. Pop. 26,000.

LENTIS'CUS, or **LENTISK,** the mastich tree (*Pistacia lentiscus*), a tree of the nat. ord. Anacardiaceæ, a native of Arabia, Persia, Syria, and the south of Europe. The wood is of a pale brown, and resinous and fragrant. *See* MASTICH.

LEO, the Lion, the fifth sign of the zodiac, between Cancer and Virgo. The sun enters it about 23rd July, and leaves it about 23rd Aug. The constellation contains the first magnitude star Regulus, the well-known sickle-shaped group, and a number of double and variable stars. There is also a small constellation, called Leo Minor, lying between Leo and Ursa Major.

LEO I, St. Leo, called the **Great,** Pope, born about A.D. 390, died in 461. The Popes Celestine I and Sixtus III employed him in important ecclesiastical affairs, and on the death of Sixtus III in 440 he was elevated to the Pontifical throne. The beginning of his pontificate was marked by persecutions of all holding the Manichean, Pelagian, Priscillian, and Eutychean heresies.

He was employed by Valentinian to intercede for peace with Attila, who, at his request, evacuated Italy. From the Vandal Genseric (455 B.C.), however, he was unable to obtain more than the promise to forbid the murder of the citizens, the burning of the city, and the plunder of the three principal churches in Rome. He is the first Pope whose writings have been preserved. In his main ambition to establish the supremacy of the Apostolic chair over the whole Christian Church he was defeated at the Council of Chalcedon (451), which affirmed the independence of the see of Constantinople.—Cf. C. H. Gore, *Leo the Great.*

LEO III, a Roman by birth, elected Pope on the death of Adrian I in A.D. 795. He commenced his rule by making submission to Charlemagne, so that when driven from Rome in 799 by his rival Paschal, Charlemagne re-established him on his throne, receiving from him in 800 the imperial crown. Leo died in 816.

LEO X, Giovanni de' Medici, second son of Lorenzo the Magnificent, born at Florence in 1475, died suddenly on 1st Dec., 1521. He received the tonsure in his seventh year, and was

loaded with benefices. In 1488, when only thirteen years old, he was made a cardinal. Although only a deacon, he was chosen to succeed Julius in 1513. He made a favourable peace with Louis XII, who was compelled to abandon Italy, and public tranquillity being thus restored in the first year of his government, he gave all his attention to the promotion of literature and the arts. The university at Rome was restored and endowed, a society established for the publication of Greek authors, and great encouragement given to scholars.

In 1518 Pope Leo issued the well-known Bull in which he defended the Papal authority in dispensing indulgences, and threatened all who maintained contrary doctrines with excommunication. Leo himself seems to have regarded the movement of the Reformation as of little importance, describing it as a squabble among the friars.—Cf. H. M. Vaughan, *The Medici Popes*.

LEO XIII, Vincenzo Gioacchino Pecci, Pope from 1878 to 1903, born at Carpineto on 2nd March, 1810, died 20th July, 1903. He received his early education at the Jesuit colleges at Viterbo and Rome, afterwards attending the schools of the Roman University to study canon and civil law. In 1837 he took holy orders, and in 1843 he was sent as nuncio to Belgium, being created at the same time titular Archbishop of Damietta. He became Bishop of Perugia in 1846, and seven years later was made cardinal by Pius IX. Having shown great activity as a cardinal, he was appointed in 1877 to the important office of Cardinal Camerlengo, and on the death of Pius IX in the following year he was elected Pope, assuming the title of Leo XIII.

Although he worked hard for the restoration of the temporal power of the Papacy, considering the Italian Government as a usurper in Rome and himself a prisoner in the Vatican, his counsel was generally one of moderation, and in foreign politics he was especially successful as a conciliator. Thus in 1885 he was appointed arbitrator in a dispute between Germany and Spain with regard to the ownership of the Caroline Islands, and he also persuaded the French Catholics to support the Republic. In Ireland he condemned the 'Plan of Campaign,' but generally allowed the Irish bishops a free hand in politics. One of the most important events during his rule was the celebrated struggle with Bismarck and the Prussian Government, known in Germany as the *Kulturkampf* (q.v.).

The pontificate of Leo XIII is chiefly remarkable for the number of encyclicals issued. Among them n be mentioned that dealing with condition of the working-classes, titled *Rerum novarum* (1891), wh was Socialistic in tone; another cyclical in 1896 pronounced agai the validity of Anglican orders. was succeeded by Cardinal Sarto Pius X.

LEOBSCHÜTZ (lā'op-shŭts), a to of Upper Silesia, on the Zinna. Man factures: woollen and linen clot Pop. 13,300.

LEOMINSTER, a borough of Her fordshire, at the junction of thr small rivers, 137 miles from Lond and 12½ from Hereford, on the G.V and L.M.S. Rlys. The magnifice church has a Norman nave. There a trade in hops and other agricultur produce and beer is brewed. At on time Leominster was a centre of th wool trade with certain merchan guilds. Pop. (1931), 5,707.

LEON, a town of Spain, capita of the province and ancient kingdon of the same name. It is 174 mile N.W. of Madrid, in mountainou country. The principal buildings ar the cathedral, a beautiful specimen o the purest Gothic (founded 1199); th church of San Isidoro, an ancien massive structure; and the fine old palace, La Casa de Los Guzmanes. Around the old city are the mediaeval walls and gates. Beyond is an industrial quarter. Pop. 29,337.

LEON, a province of Spain. It was formerly the Kingdom of Leon, a division of ancient Spain, now divided among Leon itself, Zamora, and Salamanca. Various grain crops and the vine are cultivated. Area, 5,936 sq. miles; pop. (1931), 443,604.

LEON, a city of Nicaragua, capital of the department of Leon, and formerly the State capital. The public buildings, which are considered among the finest in Central America, include a massive cathedral, an old episcopal palace, a new episcopal palace, and several churches. It is the seat of one of the three universities of Nicaragua, and also a bishopric (Roman Catholic). The town is a centre for trade in minerals, timber and coffee, which are exported from Corinto 32 miles to the N. A railway connects it with the coast at Corinto. Pop. 23,560.

LEON, a town of Mexico, state of Guanajuato, on a fertile plain 6,000 feet above sea-level, with flourishing industries of various kinds, and good railway connections. Pop. 53,639.

LEONCAVALLO, Ruggiero, Italian composer, a Neapolitan, born 1858, died 1919. He was educated at the Conservatoire in Naples, and his two-

opera *I Pagliacci*, first performed Milan in 1892, was an unqualified cess. It is still a great favourite in te of its melodramatic plot. His ras *Medici* (1893), *Chatterton* 96), *Zaza* (1900), *Der Roland von rlin* (1904), *Maia* (1900), and *lbruck* (1910) were not equally ccessful.

LEONFOR'TE, a walled town of ily, province of Catania. It carries a considerable trade in corn, wine, d silk. Pop. 17,000.

LEON'IDAS, in Greek history, a ng of Sparta, who ascended the rone in 491 B.C. When Xerxes in- ded Greece in 480 B.C., the Greek ongress sent Leonidas to defend the ass of Thermopylæ. His force, cording to Herodotus, amounted to er 5,000 men, of whom 300 were partans. After the Persians had ade several vain attempts to force ie pass, a Greek named Ephialtes etrayed to them a mountain path y which Hydarnes led a body of ersians to attack Leonidas in the ear. Leonidas and his followers fell fter a desperate resistance (480 B.C.). A monument was erected to Leonidas n the spot where the Greeks made heir last stand.

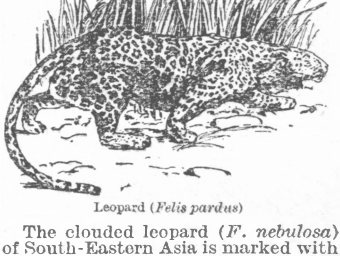
LEONIDS, name given to the streams of meteors or shooting stars, which appear to originate in the constellation Leo. These meteors are small bodies moving in regular orbits, and when entering the earth's atmosphere at a high velocity become incandescent by the friction of the air. The leonids may be observed about November 14, and at intervals of about 33 years showers of exceptional brilliancy occur when the earth crosses the orbit of a meteoric band.

LE'ONINE VERSE, a kind of Latin verse, in vogue in the Middle Ages, consisting of hexameters and pentameters, of which the final and middle syllables rhyme; so called from Leo or Leonius, a poet of the twelfth century, who made use of it, or, according to some, from Pope Leo II (A.D. 680). Traces, however, of leonine verse appear in the Roman poets. The following distich may serve as an example, being the Latin version of *The Devil was sick*, &c.:

Dæmon languebat, monachus tunc esse volebat;
Ast ubi convaluit, mansit ut ante fuit.

LEON'TODON. *See* DANDELION; but dandelion is often put in a separate genus, Taraxacum (being called *T. officinăle* or *T. denslconis*), certain allied plants being assigned to Leontodon.

LEOPARD, or PANTHER (*Felis pardus*), a carnivorous mammal inhabiting Africa, Persia, India, China, &c. The ground or general body-colour is a yellowish-fawn, which is slightly paler on the sides, and becomes white under the body. Upon this are black spots of various sizes, irregularly dispersed, a number of them being ring-shaped. Black individuals are not uncommon, especially in high lands. The African animal seems to have these ring-spots chiefly on the back, and to this form some would specially assign the name of leopard. It preys upon antelopes, monkeys, and the smaller quadrupeds, rarely molesting man unless itself attacked. It can ascend trees with great ease, often using them both for refuge and ambush. It is not infrequently trapped by means of pitfalls.



Leopard (*Felis pardus*)

The clouded leopard (*F. nebulosa*) of South-Eastern Asia is marked with dark stripes and blotches on a grey or tawny ground. The beautiful snow leopard or ounce (*F. uncia*), native to the highlands of Central Asia, resembles the common species as regards its spots, but these are larger and the ground colour is white.

LEOPARDI, Giacomo, Count, Italian poet and scholar, born at Recanati in 1798, died 1837. He was self-educated, and at an early age had written a *History of Astronomy*, and translated, with learned notes, Porphyry's *Life of Plotinus*. His famous work *Operette Morali* appeared in 1827, and his celebrated poem *La Ginestra* (The Broom) in 1836. He lived at various times in Rome, Milan, Bologna, and Florence, almost constantly a victim of ill-health; in 1833 he removed to Naples, where he died. —BIBLIOGRAPHY: A. Bouché Leclercq, *Giacomo Leopardi: sa vie et ses œuvres*; W. M. Rossetti, *Studies in European Literature*; Sainte-Beuve, *Portraits contemporains* (Vol. iii).

LEOPARDSTOWN, racecourse of the Irish Free State. About 6 miles south of Dublin, it has ten meetings yearly.

LE'OPOLD I, King of the Belgians, son of Francis, Duke of Saxe-Coburg-Gotha, was born at Coburg in 1790, and died in 1865. In 1816 he married Charlotte, daughter of George IV of Britain and heir-apparent, but she died the following year (1817), and Leopold remained in England, being created Duke of Kendal. He married a daughter of Louis-Philippe of France; their son was afterwards Leopold II. In July, 1831, he accepted an invitation to become first King of the Belgians. He made a good king. His second son, Philip, Count of Flanders, was the father of Albert, reigning sovereign of Belgium during the European War.

LEOPOLD II, King of the Belgians, was born at Brussels in 1835, died 1909. He became king in 1865. He founded the Congo Free State, primarily a private estate, but, upon a world-wide exposure of the atrocities committed in his name if not actually with his sanction, he surrendered his rights to the nation. In 1853 he married Marie (died 1902), daughter of Joseph, Archduke of Austria, by whom he had one son (died 1869) and three daughters.

LEOPOLDVILLE, a town in the Belgian Congo founded in 1882, on the left bank of the Congo below Stanley Pool. It is the capital of the Middle Congo district, and in 1923 was made the capital of the State. It is also a river port. Pop. 10,000.

LEPAN'TO, or **EPAKTO** (ancient **NAUPACTUS**), a seaport town of Greece, in the nome of Phokis; on the Gulf of Corinth or Lepanto, near the Strait of Lepanto. It is memorable for the naval battle, from which dated the decline of the Turkish power in Europe, fought within the Gulf on 7th Oct., 1571, between the Ottoman fleet and the combined fleets of the Christian states of the Mediterranean (Spain, Vatican, Venice, Genoa) under Don John of Austria, when the former was destroyed. Pop. 4,100.

LEPER-HOUSES, houses for the treatment of leprosy; once very numerous in England, nearly every important town having one or more. The house of Burton Lazars, in Leicestershire, built by Roger de Mowbray out of a general subscription raised over England in the time of King Stephen, was the head of all lazar-houses in England. It was dependent on the leper-house at Jerusalem.

From the Crusades until the Reformation these houses flourished and multiplied. Liberton, Edinburgh, was once, as the name implies, 'leper-town' of the locality, and many leper-colonies and posts are still in existence, including one in the Unit States, and another on Molok Hawaii. In the Appendix to Clelan *Statistical Tables of Glasgow* there a two notices of the lazar-houses.

LEPID'IUM, an extensive genus herbs or undershrubs of the nat. or Cruciferæ. *L. sativum* is the comm garden-cress.

LEPIDODENDREÆ, a family extinct (Palæozoic) Lycopods. Th are typically Carboniferous, but r mains are known in Devonian strat The plants resembled club-mosses general structure, but were large tree 100 feet or more in height. Many we heterosporous, and some had see like fructifications. The famili fossils known as Stigmaria represe the subterranean organs of Lepid dendreæ.

LEPID'OLITE, a micaceous miner allied to muscovite, and often of delicate pink colour. In addition t potash, it contains lithia, which some times amounts to 10 per cent. Lepi dolite is one of the minerals from whic lithia is commercially extracted.

LEPIDOP'TERA (Gr. *lepis*, a scale *pteron*, a wing), the scientific name o the order of insects which includes the butterflies and moths (q.v.), and which is so named from the presence of innumerable small membranous scales, which come off like fine dust or powder when the wings (four in number) are touched by the finger.

The scales are merely modifications of the hairs with which the wings of most other insects are covered; and from the presence of these scales the beautiful tints and colours of the lepidopterous insects are derived. The Butterflies form the *diurnal* Lepidoptera; whilst the Moths, flying about chiefly at twilight or during the night, are termed *crepuscular* or *nocturnal* Lepidoptera.

LEP'IDUS, M. Æmilius, Roman triumvir, prætor 49 B.C., consul with Julius Cæsar in 46, and in 44 appointed by Cæsar to the government of Narbonese Gaul and Nearer Spain. He was in Rome at the time of Cæsar's death, and joined Mark Antony. In 43 he united with Antony and Octavianus to form the triumvirate, obtaining Spain and Narbonese Gaul in the division of the empire. After the battle of Philippi (42) a re-division took place, in which Lepidus received Africa, where he remained till 36, when he was summoned by Augustus to assist him against Sextus Pompey. He then tried to seize Sicily, but was overcome by Augustus, who deprived him of his triumvirate and banished him to Circeii. He died 13 B.C.

LEPIS'MIDÆ, a family of minute

gless insects belonging to the ord. rsanura, having the abdomen furhed at its extremity with three idal bristles, which are used in ping. The body is covered with nute scales. The common species *pisma saccharina*) is found under t planks, or in similar damp situans; also in brown sugar or farinous material. It is sometimes led the 'silver fish.'

LEP'ROSY is a general disease hich runs a very chronic course with ute intermissions. Although leprosy s been known since very early times, d has lately been the subject of uch investigation, there is still much out it that is unknown.

Its incubation period is indefinite; e germ causing it has not been ccessfully inoculated into animals; hile the mode of infection and means transmission from man to man are ncertain. It is in most cases slowly rogressive, and only occasionally does remain stationary under treatment.

Though the mode of infection is not efinitely known, it is contagious om person to person, but only with lose contact, and usually over a long eriod.

The spread of the disease is favoured y insanitary conditions and overrowding, and though it may appear omparatively soon after possible inection, it is usually several years beore it makes its appearance. It is more common among men than women, practically never seen in infancy, and most frequent in childhood, while it is rare to find it beginning after middle life.

The first sign of the disease is the appearance of nodules in the skin, with fever and some general disturbance. These nodules are most common on the face, forearms, and thighs, but may appear on any part of the skin, and in time may become so numerous that the whole skin surface is involved. Hair does not grow on the surface of the nodule, hence the frequent loss of the eyebrows and eyelashes. The nodules may remain hard and fibrous, or break down and become ulcers. As the disease progresses it may affect the eyes, mouth, nose, and throat, with resulting marked deformity of the face.

Another form of the disease occurs where the nerves are affected, and with this type there is loss of sensation, shooting pains, twitching, and loss of the ordinary functions of the skin in the affected part. The nerves of the arm, leg, and face are most frequently attacked. This form of leprosy runs a longer course, and rarely itself causes the death of the patient, but with the nodular type the leper lives, on an average, twenty years.

Prevention of the spread of the disease is only obtained by isolation of the leper, and with the establishment of properly controlled colonies the disease has declined.

Of the many remedies tried the best results have been obtained by the use of vegetable oils, either given by the mouth or by injection, but this is not a specific for the disease. No lasting results have followed the use of other remedies, or of the various serums, vaccines, and antitoxins that have been tried. General tonic treatment is indicated in all cases, and scrupulous cleanliness, by daily antiseptic baths in the case of sores and ulcers, help the patient and make his life more tolerable.

LEPTITE (Gr. *leptos*, delicate), a fine-grained granular metamorphic rock consisting mainly of quartz and felspar. Field-observation is often necessary to distinguish a leptite of sedimentary origin from a fine-grained igneous rock of the granitic series.

LEPTOSPHÆRIA, a genus of Ascomycetous Fungi, group Pyrenomycetes. Several species cause diseases of cereals and forage plants.

LEPTOSPORANGIATE FERNS, those in which the sporangia are small and delicate, each arising from a single superficial cell. The bulk of ordinary ferns belong to this section. Opposed to Eusporangiate Ferns (q.v.)

LERICI (lā'ri-chē), a seaport of Italy, in the province of Genoa, on the eastern shore of the Gulf of Spezzia. Pop. 9,420.

LER'IDA (ancient **ILERDA**), a town of Spain, capital of the province of Larida, Catalonia. As the key of Aragon and Catalonia it was early fortified, and still continues to be one of the most important military points of Spain. Pop. (1931), 38,005.

LERIDA, a province of Spain, bounded on the north by France, has an area of 4,690 sq. miles, and is traversed by ramifications of the Pyrenees. Pop. (1931), 314,350.

LÉRINS (lā-ran), **ÎLES DE**, several small islands of France, attached to the department of Alpes-Maritimes, situated in the Mediterranean directly facing Cannes. The largest, St. Marguerite, is occupied by a prison, especially famous as the residence for twelve years of the Man in the Iron Mask (q.v.). The second, St. Honorat, contains the ruins of a once celebrated fourth-century monastery.

LERMA, Francisco Gomez de Sandoval y Rojas, Duke of, born about 1550, died in 1625. He was Spanish minister under Phillip III from 1598 to 1618. His career was chiefly marked by the unfavourable terms on

which he concluded peace with England (1604) and the United Provinces (1608); and by the decree of proscription issued in 1609, which drove thousands of Moorish families from Spain and confiscated much of their property.

LERMONTOV, Mikhail Yuriévitsh, Russian poet, born 1814, shot dead in a duel with a brother officer of the Life Guard Hussars, July, 1841. Among his best works are: *Walerik, Ismail-Bey,* and *A Hero of Our Time.*

LERNÆ'IDÆ, a family of parasitic copepod crustaceans, in which the female is found attached to various marine fishes. The young lernæan as it first comes from the egg is provided with eyes, antennæ, and locomotive limbs. These persist in the relatively minute male, but the female becomes a shapeless mass bearing a pair of egg-sacs.

LERWICK (ler'wik), capital of the Shetland Islands, in Bressay Sound, on the south-eastern shore of Mainland. There are no manufactures of consequence, but, favoured by the fine anchorage in the bay, the fishing industry thrives, herring being landed for curing in large quantities. Fort Charlotte is used as a Naval Reserve. A festival is held in the town every January. Pop. (1931), 4,221.

LE SAGE, Alain René, French novelist and playwright, was born at Sarzeau, in Brittany, on the 13th Dec. 1668, and died on the 17th Nov., 1747. His father, who was a lawyer, died when Le Sage was fourteen, leaving him under the guardianship of an uncle, who contrived to dissipate most of his money. He was educated at the Jesuit school at Vannes, and went to Paris in 1692 to study law. He qualified as a barrister, but did not secure a lucrative practice, and his marriage, which took place in 1694, drove him to take up writing as a profession.

About his plays not much need be said. Many of them are simply hack-work of the best kind, based upon the work of Spanish dramatists, especially Rojas and Lope de Vega. *Turcaret* is easily his best play; in it he imitated Molière, and showed himself no unworthy pupil. *Crispin rival de son maître* is another remarkable play, but in spite of these two triumphs it is as a novelist rather than as a dramatist that Le Sage is of world-wide importance.

As a novelist, too, Le Sage did much hack-work of a respectable but not important kind. Much of his work has a strong resemblance to that of Defoe. Among his minor novels may be mentioned *Robert Chevalier de Beauchêne,* the life of a buccaneer, whose widow, so he said, furnished the memoirs; and *Estévanille Gonzales.* The two works, however, upon which the reputation of Le Sage rests are *Le Diable Boiteux* and *Gil Blas.*

Le Diable Boiteux (The Devil on Two Sticks) appeared originally in 1707, but was revised and considerably enlarged in 1725. It borrowed its name, and the scheme and some of the language of its opening chapters, from the *Diablo Cojuelo* of Guevara. It is, however, essentially original, and is an amsuing satire on contemporary Parisian life.

Le Sage seems to have needed always to borrow a certain amount of groundwork for his writings, but once he made a start, he wrote in a highly original manner.

Le Sage's masterpiece, however, is his picaresque novel *Gil Blas.* The first two parts of it appeared in 1715, the third in 1724, and the fourth in 1735. *Gil Blas* is the crowning glory of the rogue-novel; it is a crystallization of all the best features in the work of Le Sage's Spanish predecessors. It is realistic, but not excessively so; the author would seem to have been one of the first to write with a map in front of him. It is full of satirical humour, as well as of bustling pictures of life. It deals with low life, but is never indecent. As Scott says of Le Sage: "His muse moved with an unpolluted step, even where the path was somewhat miry."

The sardonic Spanish satirist Isla (q.v.) propounded in jest the theory that *Gil Blas* was stolen from Spain, and merely translated by Le Sage. Isla's jest was taken seriously by several scholars (men of the same type as those who thought that Homer was the real author of the *Battle of the Frogs and Mice*). The Comte de Neufchâteau took up the matter ardently, and an article in *Blackwood* (1844) supported this paradoxical contention.

There is no truth in this theory, or in a similar theory propounded by Voltaire in a fit of pique that the novel was entirely taken from *La Vidad de lo Escudiero Dom Marcos d'Obrego.* Le Sage certainly borrowed freely from Spanish picaroon novels; but all that gave his work its unique value was his own.

For the writer of the world's greatest rogue-novel, Le Sage seems to have lived a singularly innocent and domesticated life. He was devoted to his wife and family, and was devotedly loved by them in return. He was born a Breton, and did not lose his Breton characteristics during his sojourn at Paris. He remained fearlessly proud and independent. His Celtic nature also showed itself in the lack of arrangement and order in his novel.

In literary history Le Sage occupies a peculiar position. His predecessors were all Spanish, and his successors English, Smollett and Fielding being the most famous. And yet he may perhaps be considered to rank after Molière as the most versatile of the great French writers.—BIBLIOGRAPHY: Leo Clarétie, *Le Sage, romancier*; G. E. B. Saintsbury, *Essay on French Novelists*.

LESBOS, a Greek island of the Ægean group, now called **MYTILENE,** from its capital. In shape it is nearly triangular; has an area of 615 sq. miles, and a population of about 161,557. It belonged to Turkey from 1462 to 1912. It is mountainous, but is exceedingly fertile, its principal products being figs, grapes, olive-oil, and pine timber. The island was famous in ancient times as a centre of Greek life and civilization. Sappho, Alcæus, Theophrastus and other famous writers lived here. It formerly contained nine cities, the chief being Mytilene.

LESGHIANS, a Tartar people of the Mahommedan religion, inhabiting Daghestan, in the East Caucasus. They were among the most stubborn of the Caucasian peoples in their resistance to the Russians, one of their chiefs, Shamyl, having held out for over twenty years.

LES'INA, an island of Yugoslavia in the Adriatic, on the coast of Dalmatia, stretching east to west for 40 miles, with a breadth of 2 to 6 miles, and presenting a continuous chain of hills, which, on the coast, form lofty and precipitous cliffs. Wine, olive-oil, and fruit are produced. The principal town, of the same name, is on the south-west coast, and has a good natural harbour. It was formerly Austrian, but now belongs to Yugoslavia. Pop. 18,000.

LESLIE, Alexander, Earl of Leven, Scottish general, born about the end of the sixteenth century, died in 1661. He went abroad, and rose to be field-marshal in the service of Gustavus Adolphus. Returning home in 1639, he was chosen general-in-chief of the Covenanters' army, and defeated the king's army at Newburn. In 1644 he went to the assistance of the English Parliament, and led a division at Marston Moor. In 1646 Charles I gave himself up to Leslie's army, then encamped at Newark. At the battle of Dunbar he served as a volunteer, and was soon afterwards thrown into the Tower by Cromwell, but was liberated at the intercession of Christina of Sweden. The peerage of Leven is now merged in that of Melville.

LESLIE, Charles Robert, painter, born in London in 1794, died in 1859. As a youth he was taken by his parents to the United States, and apprenticed to a bookseller in Philadelphia. Having shown artistic ability, he was sent to England, and became a pupil at the Royal Academy about 1813. Among his most successful early pictures were *Anne Page and Slender* (1819) and *Sir Roger de Coverley in Church* (1820). He was elected an associate of the Academy in 1821, and an Academician in 1826. From 1848 to 1851 he was professor of painting at the Academy. His *Life of Constable* is the chief authority for the life of that painter. The interest of his work is chiefly literary and historical.

LESLIE, David, Lord Newark, a Scottish general and Presbyterian leader, born in Fifeshire in the early part of the seventeenth century (about 1601), died in 1682. He served under Gustavus Adolphus, and became a colonel in the Swedish army, but returned to Scotland at the commencement of the Civil Wars, and in 1644 accompanied the Earl of Leven with the Scottish force sent to assist the Parliament. His Scottish horse supported Cromwell's decisive charge at Marston Moor.

Leslie was then recalled to check the successes of Montrose in the north, and routed him at Philiphaugh, near Selkirk. With the change in Scottish politics the Scottish army returned home, and Leslie was employed for some time in putting down insurrection, chiefly in the north and west among the Highlanders. When, however, the Scottish Parliament took up arms on behalf of Charles II, Leslie was appointed commander-in-chief, and proved himself no unworthy opponent of Cromwell, but was finally defeated at Dunbar in 1650. He afterwards retreated to Stirling, where he was joined by Charles II, who assumed the command of the army.

After the battle of Worcester Leslie was captured in Yorkshire, and imprisoned in the Tower till the Restoration. In 1661 he was rewarded for his services to the royal cause with the title of Lord Newark, and a pension of £500. The title has been extinct since 1790.

LESLIE, John, Bishop of Ross, prelate and diplomatist, born at Kingussie 29th Sept., 1527, died in a monastery near Brussels in 1596. He studied at Aberdeen, Toulouse, Poitiers, and Paris, and escorted Queen Mary from France in 1561 as one of her most active friends and a pillar of Roman Catholicism. For his intrigues on her behalf he was imprisoned in the Tower in 1571, and on his liberation in 1573

he went to France, where in 1593 he was made Bishop of Coutances.

LESLIE, Sir John, Scottish physicist and mathematician, born at Largo, Fife, 16th April, 1766, died in 1832. He studied at the University of St. Andrews, and then at Edinburgh. After a short stay in America he returned to London, where he commenced is translation of Buffon's *Natural History of Birds*, published in 1793. He invented the differential thermometer and a hygrometer about the year 1800, and four years later published his *Essay on the Nature and Propagation of Heat*. His works include: *Philosophy of Arithmetic* (1821) and *Rudiments of Geometry* (1828).

LESLIE, Shane, Irish writer. Born in 1885, he was educated at Eton and King's College, Cambridge, served in the Great War and soon began to write. His output, both in prose and verse, is considerable and includes *The Life of Cardinal Manning; Life of Sir Mark Sykes; The End of a Chapter*, an autobiography; *Mrs. Fitzherbert*, a play; and the novels, *The Oppidan, The Anglo-Catholic* and *The Cantab*. In 1932 he published *Studies in Sublime Failure*.

LESNES, name of an abbey at Plumstead, Kent. It was founded as an Augustinian house in 1178 and lasted until the Reformation. The ruins and grounds are public property.

LESSEPS, Ferdinand, Vicomte de, French diplomatist and engineer, born in 1805, died in 1894. After holding several consular and diplomatic posts he retired from the Government service, and in 1854 went to Egypt, and proposed to the Viceroy the cutting of a canal across the Isthmus of Suez. This great work was successfully accomplished during 1859–69, under his supervision. He subsequently proposed several other grandiose schemes; but the only one really taken in hand was the Panama Canal (q.v.).

LESSER ANTILLES, or **CARIBBEES,** West Indian island chain comprising the Leeward and Windward Islands; extending southwards from the Virgin Islands to Trinidad and the Venezuelan seaboard.

LESSING, Gotthold Ephraim, German critic, dramatist, and savant, born in 1729 at Kamentz, Saxony, died in 1781. He entered the University of Leipzig in 1746 to study theology, but his love of the drama and his intimacy with Schlegel, Mylius, Weisse, and other young men of literary tastes led him to abandon this intention.

After a short stay in Wittenberg he accompanied Mylius to Berlin (17 where he wrote for magazines booksellers. He undertook, w Mylius, in 1750, a publication entit *Beiträge zur Historie und Aufnal des Theaters* (Contributions to History and Improvement of Theatre); published some poems un the title of *Kleinigkeiten* (Trifle translated a work of the Span philosopher Huarte; and wrote so articles in *Voss's Gazette*. He ente at this time into friendly relatic with Moses Mendelssohn and the boc seller Nicolai, in conjunction wi whom he established the critic journal *Briefe die neueste Literat betreffend* (Letters on the Newe Literature.)

In 1755 appeared *Miss Sa Sampson*, a tragedy dealing wit English life. In 1760 Lessing becan secretary to General Tauenzien Breslau for five years, when he r turned to Berlin and published t *Laokoon, oder über die Grenzen d Malerei und Poesie*, and his comed *Minna von Barnhelm*. The *Laokoo* attempts to define the demarcatio and the limits of poetry and paintin It gradually revolutionized literar taste in Germany.

About 1767 he became director c the National Theatre at Hamburg While there he wrote his *Dramaturgi* His criticisms made him enemies, and compelled to quit Hamburg, the Duk of Brunswick appointed him hi librarian at Wolfenbüttel. In 1775 h went to Vienna, and accompanie Prince Leopold of Brunswick to Italy He married in 1776, but his wife died a year later. At this period he was involved in fierce theological disputes, which his philosophical drama *Nathan der Weise* (1779) did nothing to allay. Besides those mentioned, he wrote another drama, *Emilia Galotti* (1772).

Lessing's great aim as a writer, and particularly as a critic, was to struggle against the servility to French taste which at that time debased German literature and deprived it of originality. In this struggle he was successful; but it involved him sometimes in exaggerations, and exposed him, as well as his theological quarrels, to asperities which a less energetic writer would have avoided. By his plays Lessing gave Germany a national drama, and by his criticism he established for his nation true canons of aesthetic and dramatic criticism.—

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LESSONIA, a genus of Brown Algæ, family Laminariaceæ. The plants are tree-like, with stalks as thick as a

n's thigh, and form veritable subrine forests.

.E SUEUR (lē-sů-*eur*), **Eustache,** ench painter, born in 1617, died in 55. His first works are in the style his master, Vouet, and quite disct from his subsequent ones. His at work was the series of paintings ich he executed for the Carthusian nastery in Paris during 1645–8, deeating in twenty-two pictures the incipal scenes in the life of St. Bruno. 1650 he painted for the Corporation Goldsmiths the *Preaching of the postle Paul at Ephesus.* All of these e large paintings, and are now in the ouvre. He was one of the twelve undation members of the Acaemy. He was assisted in many of his orks by his brothers, Pierre, Philippe, nd Antoine.

LETCHWORTH, urban district of ertfordshire, 36½ miles from London, ist outside Hitchin, on the L.N.E. ly. Around the Jacobean manor ouse the first English garden city as laid out in 1903. There are rinting works and other industries. op. (1931) 14,454.

LETHAL CHAMBER, term applied o a device for killing small animals ainlessly. It consists of an air-tight hamber in which the animal is laced, a mixture of carbonic acid as and chloroform vapour being ntroduced under pressure, causing leath within a few seconds.

LETH'ARGY, an unnatural tendency to sleep, closely connected with languor and debility, or the result of some specific infection, such as that of sleeping sickness due to an organism (trypanosome) conveyed by the African tse-tse fly, or of sleepy sickness (*encephalitis lethargica*). Simple lethargy may arise from a plethoric habit, from deficient circulation in the brain, from nervous exhaustion of that organ, from a poisoned state of the blood, or from a suppression of urine.

LETHBRIDGE, city of S. Alberta. It is on the Old Man River, 760 miles from Winnipeg and 130 miles S. of Calgary, on both the C.P. and C.N. Rlys. The industries are chiefly concerned with railway work, coal mining and the distribution of goods over an extensive farming area. Pop. (1931), 13,489.

LETHE (lē'thē; Gr. *lēthē*, forgetfulness), the River of Oblivion, one of the streams of the lower regions celebrated in ancient mythology, whose water had the power of making those who drank of it forget the whole of their former existence. Souls before passing into Elysium drank to forget their earthly sorrows; souls returning to the upper world drank to forget the pleasures of Elysium.

LETO, in Greek legend the mother of the twins Apollo and Artemis. Jupiter became her lover and so Hera, in her jealousy, sent the serpent Pytho to chase her through the world. Poseidon made a refuge for her by putting a peg through the floating island of Delos. The Romans called her Latona.

LETTERKENNY, market town of Donegal, Irish Free State. It is on the Swilly, not far from Lough Swilly, on which it has a small port, Ballyraine. The chief building is the cathedral of the Roman Catholic Diocese of Raphoe. Pop. 2,308.

LETTERS OF CREDIT are mandates, giving authority to the person addressed to pay money or furnish goods on the credit of the writer. They are of two classes—'general,' when not directed to a particular person, but intended to be acted upon by anyone, and 'special,' when directed to a person named.

A general letter of credit entitles anyone who gives credit to the party named therein and who complies strictly with its terms to recover full payment from the writer. The terms generally relate to the extent of the credit and the time and mode of giving it.

Special letters of credit are chiefly issued by bankers and addressed to their foreign correspondents. Such addressees alone acquire any rights of action against the authors of the letters in respect of payments made thereunder. These letters are not generally issued until money or securities have been deposited with the issuing house.

LETTERS OF MARQUE (Fr. *lettres de marque*, commissions to plunder), commissions granted by a Government to private individuals authorizing them to wage war at sea on the ships and goods of a hostile state. Vessels so commissioned were termed privateers. The practice was abolished by the Treaty of Paris, 1856.

LETTERS PATENT, in Britain a privilege given by the sovereign in a document stamped with the Great Seal. It gives to a person or company the exclusive right of an invention. Peerages are also bestowed by letters patent. *See* PEERAGE.

LETTRES DE CACHET (or **lettres closes**). Blank orders of arrest issued by French kings, prior to the Revolution, to the governors of prisons. By this practice, abolished in 1789, it was only necessary to insert the name of an individual in such an order to effect his immediate incarceration.

LETTS, a Slavonic people closely akin to the Lithuanians, inhabiting until 1918 several Russian provinces, namely Courland, Livonia, Vitebsk and Kovno, and also the Kurische Nehrung in Prussia. There are also colonies of Letts in the Caucasus, in Canada, in the United States, and in Brazil. The Letts now form the dominant element of the Baltic Republic of Latvia.

They came from the Niemen basin, were driven north by the Slavs, and subsequently subjugated by the Teutonic Order. They are tall and robust, but shy, patient, and submissive. They are frank and hospitable. Their dialect, together with the Lithuanian, and Borussian or Old Prussian, forms the Lettic branch of the Indo-European family of languages. The Letts number about 2,000,000. *See* LATVIA.—Cf. H. Simson, *La Lettonie.*

LETTUCE(*Lactūca sativa*), a smooth, herbaceous, annual plant, containing a milky juice, and in general use as a salad. The stem grows to the height of about 2 feet, and bears small pale-yellow flowers; the inferior leaves are sessile, and undulate on the margin. The young plant only is eaten, as the lettuce is narcotic and poisonous when in flower. A number of species are known from various parts of the globe. *Lactucarium,* or lettuce opium, the inspissated juice of the lettuce, is used medicinally as an anodyne.

LEU, unit of currency in Rumania. At one time worth a franc, its real value is now ½*d.* It is divided into 100 bani and the plural is leï.

LEUCAS, or **SANTA MAURA,** one of the Ionian Islands, on the west coast of Greece. Its surface is mountainous and rugged. The eastern side is waste and barren, but the western and northern parts are very productive, yielding vines, olives, and citrons. The south-western extremity, now Cape Dukato (also known as the Leucadian Rock, or the Lover's Leap), is a white cliff rising to the height of at least 2,000 feet.

On its summit was a temple of Apollo, in whose honour a criminal was annually thrown from the rock into the sea as a sin-offering. Sappho, Artemisia, Queen of Halicarnassus, and other despairing lovers are said to have thrown themselves from it. Amaxichi (Levkas), pop. 5,500, is the chief town. Pop. of the island, 29,471.

LEUCHTENBERG (loih'ten-berh), in the Middle Ages an independent landgraviate of Germany, which, by the extinction of the male line, fell to Bavaria in 1646. From it Eugène Beauharnais took the title of Duke of Leuchtenberg.

LEUCIP'PUS, Greek philosop founder of the atomic school, l about 500 B.C., and is said by som have been a native of Abdera; others, of Elis or the Island of Mc His instructor was Zeno the Elea or according to others, Parmeni and he himself was the teacher Democritus.

Whilst the more ancient Elea reduced all that exists to a sin eternal, and immutable substar Leucippus, on the contrary, assun an infinite number of particles matter too minute to be percepti to the senses, and in themselves divisible. These atoms move fr eternity in infinite space, and by th union and separation form the ori and end of things.—Cf. Th. Gompe *Greek Thinkers.*

LEUCITE, a mineral silicate aluminium and potassium, usual with a little sodium, the potash co tent in varieties free from sodiu being as high as 21·5. The crystals a commonly white and almost opaqu and are bounded by the twenty-fo deltoidal faces of the cubic for known as the icositetrahedron. A and above 500° C. the form has tru cubic symmetry and the optical cha acters of the mineral confirm this; bu leucite is developed in volcanic lava and the crystals fail to maintain thei high symmetry during cooling.

Though not widely diffused, leucit is abundant in certain areas, such a the country near Rome and Naple and the Eifel. Leucitic rocks, or account of their high percentage o potash and the greater solubility o leucite in acids as compared with orthoclase felspar, have been ground up as agricultural fertilizers. The mineral is regarded as economically important in the rich soils of Campania.

LEUCOBRYUM, a genus of mosses, growing in much the same situations as Sphagnum, and absorbing water in similar fashion.

LEUCOCYTHE'MIA, or **LEUKOCYTHEMIA,** is the term used to describe the condition of the blood when there is a great increase in the white corpuscles. Associated with this condition there is enlargement of the lymphatic glands.

LEUCO'JUM, or **LEUCOIUM,** a genus of European bulbous plants, nat. ord. Amaryllidaceæ. They are very like snowdrops, but the six perianth-segments are nearly equal. *L. æstivum* is a British species commonly known by the name of snowflake.

LEUCOPLAST. *See* CHROMATOPHORE.

LEUCTRA, a village in Bœotia, on the road from Thespiæ to Platæa, famous for the victory of the Theban Epaminondas over the Spartan king Cleombrotus, which put an end to the Spartan domination in Greece (371 B.C.).

LEUK (loik), a town of Switzerland, canton of Valais, on the Rhone. About 5 miles to the north are the celebrated thermal saline baths of Leuk (Leukerbad), 4,500 feet above the sea, which annually attract large numbers of visitors, mainly Swiss and French, and which are used chiefly for cutaneous diseases. Pop. 1,900.

LEUTHEN, village of Silesia, 10 miles from Dresden. In the battle fought here, 5th Dec., 1757, Frederick the Great utterly defeated an Austrian army, took 12,000 prisoners, and regained Silesia.

LEV, unit of currency of Bulgaria, worth nominally a franc, but really ⅓ of a penny. It contains 100 stotinki. The plural is leva.

LEVANT', a term applied in the widest sense to all the regions eastward from Italy as far as the Euphrates and the Nile, and in a more contracted sense to the Asiatic coasts of the Mediterranean and the adjacent countries from Istanbul to Alexandria in Egypt.

LEV'EE, a type of dike or embankment (q.v.), naturally formed, which contracts the channel of a river and protects the adjacent country. A deposit of sediment carried by a stream takes place whenever there is a reduction in velocity, and thus a river's bed rises, even above the surrounding plain, but as the deposit is always greatest at the sides where the velocity is least, the levee rises faster than the bed.

Excessive floods cover the levees or burst through them. Such actions, causing great damage, occurred in 1890 on the Mississippi near New Orleans, and they are frequent on the Hoang-ho in China.

LEVELLERS, a name particularly applied to a party which arose in the army of the Long Parliament about the year 1647, and was put down by Fairfax. They aimed at the establishment of an equality in titles and estates throughout the kingdom, and were led by John Lilburne. In 1649 the ringleaders were arrested for treason, and eventually the movement was suppressed.

LEVELLING is the operation by which the heights of points on the ground relative to each other are accurately determined. The levelling instrument, or 'level,' consists essentially of a telescope and a bubble-tube rigidly, but adjustably, connected together. In the focal plane of the telescope is an arrangement of fine scratches on glass, or spider lines, which serve to fix a point in that plane. The straight line joining this point and the distant point whose image, as formed by the object glass, coincides with it is the optic axis of the telescope. If the instrument is properly adjusted, this axis is truly horizontal when the bubble is at the centre of its run.

In running a line of levelling the observer obtains a horizontal sight upon a graduated staff placed upright upon a firm point, and held in that position by an assistant. The difference between two such readings obtained upon the staff when placed on two different points is the difference in height between the points. For convenience, and for the sake of the increased accuracy which results when the two level sights are taken in quick succession, it is customary to use two graduated staves instead of one. These staves are carefully compared with each other and with a standard.

The best staves for precise levelling now consist of a painted strip of the nickel-steel alloy known as 'invar' let into a wooden casing. Formerly some hard wood, such as teak, was employed, and is still used for levelling of secondary importance. If a line of levelling return by a circuitous route to its starting-point, a check on its accuracy is obtained, for the total change of height observed should be zero. For this reason it is the rule to execute important levelling operations, such as the primary levelling of a country, in the form of a network. Numerous checks are then provided, and the whole can be computed by rigorous mathematical methods to give the most probable values of the heights. For such a network a 'datum-level surface' must be taken. The most convenient datum is mean sea-level and its 'ideal prolongation through the continents.'

The spheroidal form of the earth introduces a complication into precise levelling. An observer levelling from south to north, along what appeared from his observations to be a perfectly horizontal road at a height of several hundred feet above sea-level, would, in reality, be getting a little nearer to sea-level as he proceeded northwards.

To correct for this, and to obtain the true heights of points above the datum-level surface—the so-called orthometric heights—a small quantity has to be added to or subtracted from every result of levelling which is not due east and west. With the accuracy of modern precise levelling, it is

necessary, in all except very flat countries, to apply this correction to every portion of a closed circuit of levelling before the 'zero' check mentioned overleaf can be of any value.

Besides the accidental errors of observation to which levelling, like all other physical measurements, is subject, there is a systematic error which tends always to make the end point of a line of levelling appear a little too low. To counteract this tendency, all precise levelling operations are duplicated by lines which run in the opposite direction to the original.

The errors to be expected in the best class of levelling may be gauged by the resolution of the International Geodetic Association (1912), which defined precise levelling as that which showed errors, as worked out by specified formulæ, not exceeding the following limits per kilometre: probable accidental error, 1·0 millimetre; probable systematic error, 0·2 millimetre.—BIBLIOGRAPHY: C. Lallemand, *Lever des Plans et Nivellement*; the publications of National Surveys on Geodetic Levelling, e.g. those of the Ordnance Survey Office, Southampton; the Survey of India, Dehra Dun; the United States Coast and Geodetic Survey, Washington.

LE'VEN, a burgh and watering place of Fifeshire, at the mouth of the River Leven, on the north shore of the Firth of Forth. It carries on flax-spinning, brewing, seed-crushing, and rope-making; there are also collieries. It is connected by tramway with Kirkcaldy, and is becoming increasingly popular as a golfing centre. Pop. (1931), 7,411.

LEVEN, a Scottish sea-loch, between the counties of Argyll and Inverness, an arm of Loch Linnhe.

LEVEN, a lock or lake of Scotland, about 10 miles in circumference, in the county of Kinross. It contains four islands, on one of which (St. Serf's) there was formerly a priory. On another (Castle Island) stand the remains of the castle of Loch Leven, once a royal residence, granted by Robert III to a Douglas. Mary Queen of Scots was confined in this castle after her capture by the confederate lords in 1567, but succeeded in escaping by the aid of George Douglas, her keeper's brother, on the 2nd May, 1568.

LEVEN, name of several rivers in Great Britain. One flows through some lochs between the counties of Argyll and Inverness to Loch Leven. It is 16 miles long and its waters are used for generating electric power at Kinlochleven. Another flows from Loch Lomond through Dumbartonshire to the Clyde. It is 7 miles l and forms the **Vale of Leven,** whic famous for its bleaching and dye yards. A third Leven flows from L Leven in Kinross-shire to Largo B It is 16 miles long and is partly artificial waterway. In England th are short rivers of this name Lancashire and Yorkshire. C flows from Lake Windermere Morecambe Bay.

LEVEN, EARL OF, Scottish ti held with the earldom of Melville the Fifeshire family of Leslie-Melvil Alexander Leslie, a soldier, fought the Netherlands about 1580. Later entered the Swedish Army and aft the Thirty Years' War was made field marshal. In 1638 he co manded the army raised by the Sco to fight Charles I. He won son successes and in 1641 was made Ea of Leven. Later he fought at Marst Moor. He died 4th April, 1661.

Leven's title passed to his son a then to two daughters, and in 1682 was given to David Melville, a grea grandson. In 1707 he became Ea of Melville and since then the tw earldoms have been united. Th earl's eldest son is called Lor Balgonie, this being the name of h seat in Fifeshire.

LEVENS HALL, residence in West morland. It is 3 miles from Miln thorpe and is one of the finest Tudo houses in the country. Built by Si James Bellingham it is noted for its exquisite panelling.

LE'VER, Charles James, an Iris novelist, born at Dublin on 31s Aug., 1806, died 1st June, 1872. He graduated in arts at Trinity College Dublin, in 1827, and in medicine in 1831, taking his doctor's degree a little later at Göttingen. He then returned to Ireland to practise. He contributed his first paper to the newly started *Dublin University Magazine* (March, 1834), of which he became editor in 1842.

The first chapter of *Harry Lorrequer* appeared in that magazine in 1837. His *Charles O'Malley*, *Tom Burke*, and *Jack Hinton* constituted a literature entirely *sui generis*. His later novels were more thoughtful, but less characteristic.

LEVER, district in Lancashire. **Little Lever** is an urban district just outside Bolton. It is a cotton manufacturing and coal mining centre. Pop. (1931) 4,944. **Great Lever** is an adjoining area, but is not an urban district.

LEVER, a bar of metal, wood, or other substance turning on a support called the *fulcrum* or *prop*, and used to balance or overcome a certain re-

sistance (called the *load*) encountered at one part of the bar by means of a force (called the *effort*, formerly the *power*, a term now used with a different signification) applied at another part.

It is one of the mechanical powers, and is of three kinds, viz.: (1) When the fulcrum is between the load and the effort, as in the handspike, crowbar, &c. In this case the parts of the lever on each side of the fulcrum are called the arms, and these arms may either be equal as in the balance, or unequal as in the steelyard. (2) When the resistance is between the effort and the fulcrum, as in a smith's bellows. In the case of a rowing boat, the resistance of the rowlock is between the effort applied by the oarsman and the fulcrum formed by the water, but the propulsive force in this case is the excess of the pressure on the rowlock over the effort of the oarsman. (3) When the power is between the weight and the fulcrum, as in raising a ladder from the ground by applying the hands to one of the lower rounds, the fulcrum in this case being the foot of the ladder. The law which holds in the lever is: the power multiplied by its arm is equal to the weight multiplied by its arm.

It is evident that when the power has a very large arm, and the weight a very small one, a very small power will overcome a great resistance. In the lever, as in all machines when a small force overcomes a great one, the small force acts through a much greater distance than that through which the great force is overcome, or, as is sometimes said, 'What is gained in power is lost in time,' or more correctly, 'What is gained in *mechanical advantage* is lost in *speed*.'

LEVERHULME, VISCOUNT, English title borne by the family of Lever. William Hesketh Lever was born in Bolton, 19th Sept., 1851, his father, James Lever, being a grocer there. He was educated at elementary schools and entered his father's business as a commercial traveller. In 1886 he began to manufacture soap at Wigan, and, aided by effective advertising, he made his Sunlight brand known all over the world. On the Mersey, a model town, Port Sunlight, was built, and the firm of Lever Bros. became the largest of its kind in the world. Many other concerns were amalgamated with it and before its founder died the combine had a capital of nearly £50,000,000. In 1929 there was a further big amalgamation with the Margarine Union and the firm of Unilever, Ltd., came into existence. A new building, Unilever House, Blackfriars, London, was opened in July, 1932, as the headquarters.

Lever had many and varied interests outside his business. He was a Nonconformist, but also a discriminating patron of the theatre. As a Liberal he sat in Parliament for the Wirral Division, 1906–10. As a social reformer he advocated a short working day and introduced a system of profit sharing. To foster the native industries of the Scottish Highlands he bought, in 1918, the island of Lewis, but this was less successful than his other ventures. His interests in Africa were extensive and there, too, he showed practical philanthropy. In 1911 Lever was made a baronet, in 1917 a baron and in 1922 a viscount. He died 7th May, 1925, when his only son, William Hulme Lever, became the 2nd viscount.

LEVERRIER, Urbain Jean Joseph, French astronomer, born at Saint-Lô, in Normandy, 1811, died at Paris 1877. He devoted himself at first to chemical research, but drew the attention of Arago by some memoirs on the stability of the solar system, and he was induced to persevere with astronomical studies. His observations on the transit of Mercury in 1845 procured him admission into the Academy of Sciences.

His great work was his investigation of the irregularities in the movements of the planet Uranus, carried on independently, but at the same time as the researches of John Couch Adams, which led to the discovery of the planet Neptune.

He entered political life in 1849, and was made a Senator by Napoleon III. He succeeded Arago as director of the observatory, but his arrogance and violence of temper made his tenure of the office a failure. His tables for sun and planets are in general use among astronomers.

LEVESON-GOWER, name of an English family represented by the Duke of Sutherland and Earl Granville. Sir Thomas Gower, a landowner in Yorkshire, was made a baronet in 1620. His descendant, who had taken the additional name of Leveson and owned land in Staffordshire, was made a baron in 1703. In 1746 John, the 2nd baron, was created Earl Gower and the 2nd earl was created Marquess of Stafford in 1786. The 2nd Marquess of Stafford married the Countess of Sutherland, a great heiress, and was made Duke of Sutherland. The first Earl Granville was a younger son of the first Marquess of Stafford.

LEVI, biblical character, the third son of Jacob and Leah and regarded as the ancestor of the tribe of the

same name. Levi is also an alternative name for St. Matthew.

LEVI'ATHAN, a form of the Hebrew word *livyathan*, meaning a long-jointed monster, applied in *Job*, xli, and elsewhere in Scripture, to an aquatic animal variously held to be the crocodile, the whale, or some species of serpent.

LEVIS, a town of Quebec, Canada, on the St. Lawrence opposite Quebec. It is on the C.N.R. and Quebec Central Railways, and steam ferries cross the river. There are docks for shipping, and some manufacturing industries. Pop. (1931), 11,724.

LEVITATION, term applied to the alleged phenomenon of raising heavy bodies in the air so that they remain suspended without mechanical means. The idea is referred to in many ancient writings. The Neoplatonist, Iamblichus, was said to have been levitated ten cubits from the ground during meditation. In modern times levitation has been claimed by spiritualistic mediums, such as Daniel Home.

LE'VITES, the name generally employed to designate not the whole Jewish tribe that traced its descent from Levi, but a division within the tribe itself, in contradistinction to the priests, who are otherwise called the 'sons of Aaron.' They were the ministers of worship, specially singled out for the service of the sanctuary. Together with the priests they formed the sacerdotal tribe.

A permanent organization was made for their maintenance. In place of territorial possessions they were to receive tithes of the produce of the land, and in their turn to offer a tithe to the priests. After the settlement in Canaan, to the tribe of Levi were assigned forty-eight cities, six of which were cities of refuge, thirteen of the total number being set apart for the priests.

To the Levites was to belong the office of preserving, transcribing, and interpreting the law, and they were to read it every seventh year at the feast of tabernacles. Their position was much changed by the revolt of the ten tribes, and they are seldom mentioned in the New Testament, where they appear as the types of formal, heartless worship.

LEVIT'ICUS, the name of the third book of the *Pentateuch*, so called from the first word of its contents. With the inclusion of certain portions of *Exodus* and *Numbers*, it has been denominated *The Priestly Code*, and is sometimes also called the *Law of Offerings*. It consists of seven principal sections, but it may be generally described as containing the laws and ordinances relating to Levites, priests, and sacrifices.

LEVY, POLITICAL. Before the payment of salaries to British members of Parliament under a resolution of the House of Commons adopted in August, 1911, the members of the Labour Party in the House, practically all of them working men with no private means, received from the party funds a salary (or allowance) of £200 a year. Election expenses and other charges were also paid from this fund, which was maintained by contributions from the party's affiliated organisations (except the trades councils) at the rate of one penny per member. The fund was established in 1903. In 1905 the legality of trade union contributions to a fund of this character was called in question by a ruling of the Chief Registrar of Friendly Societies who held in respect of the rules of one union that 'Labour Representation' (i.e. the securing of seats in Parliament for Labour members) was not amongst the objects of trade unionism as specified by the Trades Union Act of 1871, as amended by the Act of 1876.

In July 1908 an important ruling was given in the case of *Osborne* v. *Amalgamated Society of Railway Servants* to the effect that unions could properly and legally subscribe to political party funds. On appeal, in 1909–10 this decision was reversed and it was laid down that unions were acting *ultra vires* in using any of their funds for political purposes. The decision of the Court of Appeal was sustained by the House of Lords. As a result of considerable agitation the Liberal Government introduced and carried, in 1913, an Act which placed the whole question of political activities by the trade unions on a new basis.

The 1913 Act provided that unions might include political objects among their objects and raise funds for political purposes on condition (1) that they were authorized to do so by a ballot of their members and (2) the money spent on political objects was raised by a special levy.

This was the origin of the political levy. The term applies to the contributions paid by trade unionists to the political funds of their unions as sanctioned by ballot and regulated by Acts of Parliament. Under the 1913 Act nearly 300 unions took ballots; in less than a score of cases was there a majority against the establishment of political funds; and in the vast majority of cases the ballots taken also sanctioned the unions' affiliation to the Labour Party. As the latter was a foregone conclusion the Liberal

ernment inserted in the 1913 Act provision permitting individual abers of trade unions which had s ballotted to 'contract out' (i.e. claim exemption from payment he political levy); in practice less a half of the number who voted in se ballots against payment of the tical levy claimed exemption by ng in the required form; but never-less the political levy was de-anced by the other parties as a annous exaction, and in 1927 a ther change was made in the law erning the payment of political tributions by trade unionists. Under the Trade Disputes and ade Unions Act, 1917 (Section iv) e 1913 Act is amended to provide trade union expenditure upon litical objects (which are specified) condition that (1) the payments e made out of a separate fund (2) member is not required to contri-te to this fund unless before the te upon which the contribution is ne he has delivered in writing in the propriate form an intimation of his illingness to contribute. If no such ritten intimation is given a member deemed to be exempt from the bligation to contribute to the olitical fund; by reason of such exemption he is not to be excluded om any benefits of the union or laced at a disadvantage as compared ith contributing members (except in elation to the control and manage-ent of the political fund); and, oreover, contribution to the political und is not to be made a condition f admission to the union. Under he operation of the 'contracting in' ondition imposed by the 1927 Act rade union contributions to the Labour Party fell substantially in mmediately subsequent years, but nost of the unions have made special efforts to secure 'contracting in' forms from their members as the law provides that when a member has 'contracted in' his liability to contribute to the political fund of his union continues until he makes a fresh application for exemption.

LEWES (lō-es), **George Henry,** philosopher and author, born in London in 1817, died 1878. He was literary editor of *The Leader* (1849–54), and published his *Life of Robespierre* (1850) and a compendium of *Comte's Philosophy of the Sciences* (1853). His *Life of Goethe*, which won him a European reputation, was published in 1855. From 1854 until his death Lewes lived with George Eliot (q.v.).—Cf. J. W. Cross, *George Eliot's Life as related in her Letters and Journals.*

LEWES (lō'es), a municipal borough and market town of England, in Sussex, of which it is the county town. It is a place of great antiquity, containing the ruins of many ecclesiastical buildings. The remains of its Norman castle were presented to the nation in 1920. It is an agricultural centre, and has a racecourse. In the suburb of Southover are some fine old houses, including one that belonged to Anne of Cleves, and the ruined priory of St. Pancras. From 1295 to 1885 Lewes was separately represented in Parliament, and in the Middle Ages it was a centre of the wool trade. In its vicinity, on 14th May, 1264, the barons, under Simon de Montfort, defeated the army of Henry III. Pop. (1931), 10,785.

LEWIS, Matthew Gregory, an English romanticist and dramatic author, nicknamed 'Monk' Lewis, born in London 1775, died 1818. He was educated at Westminster, and then travelled for some time in Germany, the romantic literature of which gave him that passion for the marvellous and terrific which chiefly marks his writings.

His earliest and most celebrated work was *Ambrosio, or the Monk* (1794), a romance, the first edition of which was suppressed for its licentiousness. It is what is known as 'a Gothic romance,' but contains incidents taken from German romance, and is historically interesting as a thread connecting the literature of Germany and England. Other works were: *Feudal Tyrants*, a romance; *Romantic Tales*; *Tales of Wonder*, in verse; *Tales of Terror*; *The Castle Spectre*, a romantic drama (1798); *Adelmorn the Outlaw* (1800); and *Alphonso, King of Castille* (1801).

LEWIS, Sinclair, American novelist. He was born in Minnesota, 7th Feb., 1885, the son of a doctor, and was educated at Yale. He became a journalist and acted as editor for several publishers. In 1914, with the publication of *Our Mrs. Wren*, he became known as a novelist and his popularity reached Britain with *Main Street* (1920) and *Babbitt* (1924). Other novels are *Free Air*, *Martin Arrowsmith*, *Elmer Gantry*, *The Man Who Knew Coolidge*, *Dodsworth* and *Anne Vickers* (1933). In 1931 he was awarded the Nobel prize for literature.

LEWIS GUN, an automatic magazine rifle following the general lines of the machine-gun, originated by a corporal of the Belgian army about the year 1901, and improved and patented by the Lewis Manufacturing Company of the United States in the following year. It was offered to different European Powers, but, after tests, was rejected by all of them as

being too flimsy for the hard usage of war. In the years 1907, 1909, and 1912 numerous alterations were made and patented, but it was not taken up to any extent by any great military Power.

Somewhere about the second year of the European War the vital necessity of providing more machine-guns of a mobile type became apparent to the British Government; in consequence large orders were placed for Lewis guns both in America and with Vickers's, and thousands were issued to British troops as they became available.

At first these guns were used only for defence and attack against enemy personnel, but as time went on they proved, when fitted with anti-aircraft sights and a special mounting, very useful against low-flying enemy planes; the fact that they can be fired from the shoulder in almost the same manner as a shot-gun has considerably increased their value for this work.

The gun itself is an automatic rifle firing ordinary rifle ammunition, and is worked by a combination of gas and a spring. On the pressure of the trigger the spring draws the bolt and cartridge forward and explodes the cartridge; then part of the gas generated by the explosion, following up the bullet in the barrel, passes through a small aperture into a cylinder, strikes the head of a piston, and drives it back again. This rotates the magazine, places a fresh cartridge in front of the bolt, and compresses the spring again.

The pan or drum, as the magazine is called, is circular in shape with an indented outer surface. On the inside the indentations take the base of the cartridges, and the outer corrugations act as cogs for the automatic rotation of the magazine.

The magazine or drum contains forty-seven rounds, and a good gunner can change to a fresh magazine in three seconds. The gun, when well tuned up, can fire at the rate of from six to seven hundred rounds per minute over a period, but owing to heating and the time taken in changing magazines, no more than two hundred and fifty rounds can be fired in a given minute.

It is an air-cooled weapon, the cooling of which is accomplished by means of an aluminium radiator placed round the barrel and covered by a metal cylinder open at both ends. Each explosion drives out the hot air in front and behind, causing a vacuum, and the cooler outer air rushes in to take its place.

Owing to its peculiar noise when firing, it is unmistakable, and if not well concealed can easily be detected, but it has the great advantage presenting a small target, as with two gunners it only occupies a sp of 7 feet by 2 feet.

It is very mobile as compared w the Vickers or Maxim gun, and w magazine and bipod in position only weighs about 32 lb. A spa parts bag is carried, and almost a part can be replaced if broken, most complicated replacement tak on an average fourteen seconds wl done by a good man.

LEWISHAM, a parliamentary a metropolitan borough, in the cour of London, and third largest of the metropolitan boroughs. It is the S. side of the river, extending the border of Kent, and covers abo 11 sq. miles, with several stations the S. Rly. It includes Catford, L Forest Hill, Bellingham, Hither Gre and parts of Blackheath, Downha Brockley and Sydenham. The tov hall was enlarged in 1931 and t S.E. Polytechnic opened in the san year. Some of the land belongs to t Earl of Dartmouth, whose eldest s is called Viscount Lewisham. Po (1931), 219,942.

LEWISTON, a city of Main United States, on the Androscoggi River, close to Lake Auburn, th Maine State piscicultural reserv Pop. 31,707.

LEWIS-WITH-HARRIS, or TH LEWS, the largest of the Oute Hebrides, separated from the main land of Scotland by the Minch, 30 t 35 miles wide. The southernmost por tion of the island, Harris, is in Inver ness-shire, the northern and larges portion, or Lewis proper, being i Ross-shire. The entire length of th island, south-west to north-east, is 6(miles; breadth, varying from 30 mile to 5 and 10 miles; area, nearly 600,000 acres. It is of irregular form, is deeply indented all round by bays and inlets, and though in general flat, contains some considerable elevations, two of which rise to 1,500 feet above sea-level.

In the interior peat-bogs occur, with numerous small lakes and short rivers. Both the inland and coast fishing is good. Up to 1844 agriculture and education were in a very backward condition; but considerable improvements have been since made, though the fishery still waits a satisfactory development. The industries are the growing of barley, oats and potatoes, the raising of sheep and cattle, fishing and weaving. There are relics of the Druids and some stone circles at Callernish. In 1919 Lord Leverhulme bought Lewis and part of Harris. The Gaelic language is almost universally spoken. The principal

town is Stornoway. Pop. of entire island (1931), 29,672.

LEXINGTON, a city of the United States, in Kentucky. It is the oldest town in the state (having been founded in 1775), and was once the capital. It is more a place of fashionable residence than of trade. It contains the Kentucky State university, and the Transylvania University, removed from Harrodsburg in 1865. Incorporated in 1782, Lexington became a city in 1832. Pop. (1930), 45,736.

LEXINGTON, a small town of the United States, in Massachusetts, the scene of the famous 'Skirmish at Lexington,' the opening engagement of the War of Independence, 18th April, 1775. A detachment of British troops, sent from Boston to seize some provincial stores at Concord, was opposed by the Lexington militia (70 men), who were dispersed with a loss of seven killed and three wounded. Pop. 9,467.

LEYDEN, John, Scottish poet and Orientalist, born at Denholm, Roxburghshire, 1775, died at Batavia 1811. He was distinguished for his remarkable gifts as a linguist. He published translations and original poems in the *Edinburgh Magazine*, contributed to Lewis's *Tales of Wonder*, assisted Sir Walter Scott in procuring materials for his *Minstrelsy of the Scottish Border*, and wrote a *History of African Discoveries*. In succession he was Presbyterian minister, surgeon with the East India Company, professor of Hindustani, and judge.

LEYDEN, or **LEIDEN** (Lat. *Lugdunum Batavorum*; Fr. *Leyde*), a university town of the Netherlands, encompassed by windmills, and surrounded by country-seats, pleasure-grounds, gardens, and fertile meadows. The streets are straight and broad, the Broad Street (*Breede-straat*) being esteemed one of the finest in Europe. In it is situated the town hall (*Stadhuis*), a picturesque sixteenth-century building. None of the churches is very remarkable, but in the Reformed church of St. Peter are monuments to Boerhave, Spanheim, and Scaliger. The university, founded in 1575 by William of Orange, was formerly one of the most famed in Europe.

Leyden has cloth and other manufactures. It was the birth-place of several celebrated painters, Rembrandt, Gabriel Metsu, and others.

LEYDEN-JAR, a form of electric condenser devised by Cuneus and Musschenbroek of Leyden in 1746. It consists of a glass jar or wide-mouthed bottle coated inside and out with tin-foil over the lower two-thirds of the surface. A brass rod passing through the neck is connected to the inside coating, and terminates outside in a brass knob which receives the charge.

The jar, either singly or combined to form a battery, was used in studying the various phenomena of electric discharge. To discharge the jar, the two coatings are connected by a suitable conductor, taking care to make contact with it first on the outside coating.

A Leyden-jar with movable coatings is useful for demonstrating the important part played by the medium which insulates the two coatings. After being charged, the jar is dissected by means of insulating tongs, and the two coatings are discharged. On rebuilding the jar and connecting the two coatings, a strong spark passes, indicating that the electric energy is stored in the insulator or dielectric rather than on the metal coatings of the condenser. The term 'jar' is now used as the name of a unit of electrical capacity equal to 1,000 centimetres, or the 900th part of a microfarad. *See* CONDENSER.

LHASA, capital of Tibet, on the Ki-Chu, a tributary of the Tsing-po (Upper Brahmaputra). All public buildings have a religious significance, for Lhasa is the focus of international Asiatic Buddhism, and a place of pilgrimage. About 1½ miles south-west from the city is the Potala, the residence of the Dalai-Lama, joint-god and king of Tibet, and supreme pontiff of vast regions in Central, Eastern, and South-Eastern Asia. It stands on a hill rising abruptly out of the plain to the height of 367 feet, extensive and imposing, surrounded by enormous lamaseries.

Lhasa is the principal emporium of Tibet: silks, tea, and Eastern merchandise are exchanged in the markets for Tibetan, Indian, and European goods. No census has ever been taken, and the floating population is abnormal on account of the multitude of nomadic pilgrims and wandering lamas who visit the capital from time to time. The estimated population is 50,000.—BIBLIOGRAPHY: E. Candler, *The Unveiling of Lhasa*; Sarat Chandra Das, *Journey to Lhasa*; L. A. Waddell, *Lhasa and its Mysteries*.

LI, LE, or **CASH,** the only copper coin of China, with a square hole in the middle, and an inscription on one side. Ten li make one candareen (fên), 100 a mace (ch'ien), 1,000 a liang or tael, a silver coin weighing 1 k'up'ing or treasury-scale tael, or ounce (1⅓ oz. avoirdupois). Li is also a Chinese measure of length equal to about one-third of an English mile.

LIAO-TUNG, peninsula of Manchuria, also the name of the adjoining gulf. It was ceded to Japan in 1895, but was soon returned to China. In 1905 the southern part of the peninsula, leased to Russia, was transferred to Japan and since then has been ruled by that country. It contains Port Arthur and Dairen, which is the capital. Total area, with adjacent islands, 1,337 sq. miles; pop. (1930), 1,328,011, of whom 227,000 are Japanese.

LIAO-YANG, town of Manchuria. It is on the railway and is a populous trading centre. Here, in Aug.-Sept., 1904, there was some fierce fighting between the Japanese and Russian armies. In the end the Russians retreated and the Japanese entered Liao-Yang, but the victory was by no means decisive. Pop. 100,000.

LIAS, in geology, a name derived, by Somerset pronunciation, from *layers,* and originally given to thin layers of limestone embedded in thick masses of blue argillaceous clay, lying at the base of the Oolitic series, and above the Triassic or New Red Sandstone. The term is now international as a synonym of the Lower Jurassic series.

The formation is highly fossiliferous, from Whitby to Lyme Regis, ammonites being found in such quantities and varieties as to be called into use in the classification of the different beds. Of all its fossil remains by far the most important in England are those of the great reptiles, such as ichthyosaurus and plesiosaurus.

LIBANIUS, Greek sophist and rhetorician, born at Antioch about A.D. 314, died at the same place about 393. He studied at Athens, and taught with great success at Constantinople and at Nicomedia. He used his eloquence in obstructing the spread of Christian ideas, and in the defence of paganism.

St. Basil and St. Chrysostom were his pupils, and were warmly attached to him. His letters, 1,600 in number, have, besides great literary merit, much historic value, as they were addressed to the most eminent men of his time. Ben Johnson derived the central idea of his farce *Epicoene, or the Silent Woman,* from Libanius.

LIBAU (lē'bou; Russ. *Libava*), or **LIEPĀJA,** an important seaport and city of Latvia, in Courland, at the mouth of the lake of the same name, on the Baltic, 150 miles from Riga. It is a favourite bathing-resort, and had a considerable trade before the European war, during which Libau was several times shelled by German warships, and was captured by the enemy in 1915. It became a free port in 1921. In the neighbourhood are sulphur springs. Pop. (1930), 57,238.

LIBEL, in law, the act of publishing malicious statements with intent to expose persons or institutions to public hatred, contempt, or ridicule, and thereby provoking them to anger, causing a breach of the peace, injury to reputation, business, &c. The difference between libel and slander is that in the former case the defamation must have been effected in writing, printing, or some other visible manner, while in the latter the offence is committed verbally.

Publication is held to have taken place if the libel is seen but by one person other than the person libelled. The law distinguishes defamatory, seditious, and obscene libels. A defamatory libel may result in civil and criminal proceedings against both the publisher and the writer, but to come under this category it is essential that the libel be false, malicious (the law presuming malice in every injury done intentionally and without justification), have a tendency to provoke hatred or contempt, and that it be non-privileged.

In criminal law it is a misdemeanour to publish or threaten to publish a libel; or, as a means of extortion, to offer to abstain from or to prevent others from publishing a libel. In Great Britain the maximum punishment for this offence is three years' imprisonment with hard labour.

A seditious libel is one directed against the head of the State, the legislature, the courts of justice, &c., and its publication also constitutes a misdemeanour. The term obscene libel comprises any obscene publication, and the publisher thereof is liable to imprisonment with hard labour. If the charges contained in the libel are true, a civil action cannot be maintained, but the truth of the libellous matter is no defence at common law; at the same time it generally secures the defendant the merciful consideration of the court.

In a civil action the plaintiff recovers damages, the amount of which is settled by the jury; upon an indictment, the jury has merely to acquit the defendant or to find him guilty, after which the court passes judgment, and awards punishment, generally fine or imprisonment, or both. In a charge against the proprietor, publisher, or editor of a newspaper, evidence may be given of the publication being (*a*) for the public benefit; (*b*) true, fair, and accurate; and (*c*) without malice.

Fair and accurate reports of judicial proceedings and of public

meetings, meetings of town councils, education authorities, &c., are generally privileged, and the order of a judge is necessary before a criminal prosecution can be instituted.

LIBEL, in the English ecclesiastical and admiralty courts, is the name given to the formal written statement of the complainant's ground of complaint, in the civil litigation, against the defendant. In Scots law, an indictment on which a criminal prosecution takes place.

LIBERAL PARTY, THE, one of the great political parties of the State, has been so named since about 1830. It developed from the old party of the Whigs, which term, together with that of its rival, the Tories, was first used as a nickname in 1679. This party has held office under Earl Grey, Viscount Melbourne, Earl Russell, Viscount Palmerston, Mr. W. E. Gladstone (its greatest figure), Lord Rosebery, Sir H. Campbell-Bannermann, and Mr. Asquith (later Lord Oxford and Asquith).

It has been responsible for many famous measures of reform, and throughout its history has engaged in a fierce struggle with the House of Lords, which rejected many of its measures. This culminated in 1911 with the passing of the Parliament Act, which severely limits the powers of the peers. Advanced Liberals in the latter part of the nineteenth century termed themselves Radicals, but this designation has now fallen into disuse.

For a time before the present Labour Party took definite form, a number of Liberal-Labour candidates, mainly radical trade unionists associated with the Liberal Party, were returned to Parliament. The Liberals lost some of their strongest members by the Liberal Unionist (q.v.) secession in 1886, and were almost wiped out of existence at the General Election of 1918. This election marked the crucial stage of the rupture between the followers of Mr. Asquith and those of Mr. Lloyd George, the latter having succeeded Mr. Asquith as Premier of the second Coalition Government formed at the end of 1916.

The rift was accentuated by Mr. Lloyd George's action in Jan., 1922, of forming his Coalition Liberals into the National Liberal Party, between whom and the old Independent Liberals, as they are termed, a bitter feud arose.

The strength of the Liberal party declined in succeeding General Elections—its places as official Opposition and alternative Government was taken by the Labour Party (q.v.). In the 1931 General Election the Liberals fought in a very divided condition there being three main groups, via. the two groups led by Sir John Simon and Sir Herbert Samuel, which supported the National Government and the group led by Mr. Lloyd George which joined the Opposition. This latter group numbered only half a dozen members the combined Simon-Samuel groups totalling 66. On the issue of Free Trade, brought to a climax by the Ottawa Conference (q.v.) Sir Herbert Samuel withdrew from the Government but did not formally pass over to the Opposition; so that Liberal disunity is now (1933) more pronounced than ever and the recovery by the Liberal party of the historic position it held up to the outbreak of war seems remote.

The **Liberal Central Association,** which is maintained by a number of Liberal associations throughout the country, has offices at 21, Abingdon Street, London, S.W. Associated with it is the **National Liberal Federation,** which holds a conference every year.

LIBERAL UNIONIST PARTY, THE, was formed in 1886 by those Liberals who disagreed with Mr. Gladstone's Home Rule Bill, and, headed by Mr. Joseph Chamberlain and Lord Hartington (afterwards Duke of Devonshire), seceded and entered into a compact with the Conservatives whereby the latter agreed not to contest their seats. The name 'Unionist' was first suggested by Lord Randolph Churchill in a speech at Manchester on 2nd March, 1886.

Liberal Unionists held important positions in the Salisbury Government of 1895, and steadily the party became fused with the Conservatives. Only a few returned to the Liberal fold.

A separate organization was maintained until May, 1912, when it was united with the Conservatives under the title of The National Unionist Association of Conservative and Liberal Unionist Organizations, and the members of both became known as Unionists.

A great deal of bitterness was imparted into politics by the secession, but Mr. Chamberlain's powerful personal influence carried practically the whole of the Midlands. Some of the Liberal Unionists objected to Mr. Chamberlain's Tariff Reform (Protectionist) proposals in 1903, and formed the Unionist Free Food League, which, however, had a brief existence.

When the Irish Treaty, giving Ireland the status of a Free State, was signed in 1921, the term Unionist was declared to be a misnomer. By that time, however, the Liberal Unionists had become completely sub-

merged in the Conservative party, and there has never been any question of a return to the Liberal party.

LIBEREC. *See* REICHENBERG.

LIBE'RIA, a negro republic on the west coast of Africa, founded in 1822 by liberated American slaves under the auspices of the American Colonization Society, and recognized as an independent state 26th July, 1847. It has 350 miles of seaboard, and extends some 200 miles inland; area, about 43,000 sq. miles. The soil is fertile, but the agricultural, mining, and industrial development of the country has just begun.

The chief crop is indigenous coffee, other exports being palm-oil, groundnuts, rubber, annatto seed, and rice. The climate is very unhealthy for Europeans. British weights, measures, and coinage are mostly in use, but there is a Liberian coinage in silver and copper.

English is the official language. Liberia was one of the original members of the League of Nations. The population is estimated at 1,000,000, all of African race. The number of American Liberians is about 12,000; Monrovia is the capital, and has a wireless station. The government of the republic is on the model of the United States.—BIBLIOGRAPHY: L. Jore, *La République de Libéria*; Sir H. H. Johnston, *Liberia: the Negro Republic in West Africa.*

LI'BRA, the seventh sign of the zodiac. The First Point of the sign Libra, now in the constellation Virgo, is where the sun's annual apparent path passes from north to south of the equator. The time of its passing this point is called the *autumnal equinox.*

LIBRARIES, the name given to collections of books, and to the buildings in which such collections are located. Libraries existed in ancient Egypt, and Diodorus Siculus describes the library of King Osymandias (Rameses II, about 1300–1233 B.C.). From very early days almost every important temple in Babylonia had its library of clay tablets in cuneiform writing, shelved in regular order. Such a library was found at Nippur, in 1901, in the great temple of Bel.

In his palace at Nineveh King Assurbanipal (seventh century B.C.) gathered a great library of probably over 10,000 works. Pisistratus is credited with having introduced a public library at Athens about 537 B.C. Cicero and various wealthy Romans made collections of books, and several Roman emperors established libraries, partly with books obtained as spoils of war. By far the most celebrated library of antiquity was the Alexandrian.

In the West, libraries were founded in the second half of the eighth century by the encouragement of Charlemagne. In France one of the most celebrated was that in the abbey of St. Germain des Prés, near Paris. In Germany the libraries of Fulda, Corvey, and in the eleventh century that of Hirschau, were valuable. In Spain in the twelfth century, the Moors had seventy public libraries, of which that of Cordova contained 250,000 volumes.

In Britain and Italy libraries were also founded, particularly in Britain by Richard Aungerville; in the latter by Petrarch, Boccaccio, and others. The art of printing revolutionized the mediæval art of book-making.

The principal libraries of modern times are the National Library at Paris with 3,000,000 books and 100,000 MSS., and the British Museum library, London, with about 4,000,000 books and 100,000 MSS. The central court library at Munich, the former imperial library at Petrograd, and the former royal library at Berlin have each over a million volumes and thousands of MSS. Other large and valuable libraries are the library at Vienna; the libraries at Stuttgart, Dresden, and Copenhagen; the university libraries of Genoa, Prague, Göttingen, Upsal, Oxford, Cambridge, and Dublin; also the libraries of Moscow, Venice, Florence, Milan, Bologna, Naples, and the National, Edinburgh. The Vatican library, Rome, and the Bodleian, Oxford, are particularly rich in rare books and MSS. In 1932 the Carnegie Trust decided to contribute towards a new building in London for the Central Library for Students.

Many of the town libraries were built by Andrew Carnegie, who also founded the United Kingdom Carnegie Trust for the purpose of carrying out and extending his work in this and other educative respects. He endowed the Trust with a sum of £2,500,000.

The French Government has established over 25,000 popular libraries in connection with primary schools. The Congress Library, Washington, possesses over 2,500,000 volumes; the public library of Boston, the libraries of Harvard University, Cambridge, Yale University, and Newhaven possess each over 1,000,000 volumes. The New York Public Library possesses over 2,000,000 volumes.—BIBLIOGRAPHY: E. A. Savage, *The Story of Libraries*; E. C. Richardson, *The Beginnings of Libraries*; *Minerva, Jahrbuch der Gelehrten Welt*; *The Library World.*

LIBRATION, in astronomy, generally applied to an apparent oscillatory motion of the moon. Approximately the moon always presents the same hemisphere towards the earth, owing to the synchronism of its rotation and revolution periods. But its rotation is uniform, while its revolution, being in an ellipse, varies in speed. Thus at one time we see a little more of its eastern, at another of its western side. This is called libration in longitude.

Owing to the fact that the moon's axis of rotation is inclined 6½° to the normal to its orbit, there is also a libration in latitude. Through the librations about 59 per cent of the lunar surface is visible at one time or other, leaving only about 41 per cent perpetually invisible.

LICENCE, in law, the grant of permission to do some lawful act, also the document conferring such authority. All civilized countries require that persons should not carry on certain trades or professions, or do certain acts, without previous grant of licence, and such licences may be imposed for the sake of regulating traffic or raising revenue. Most numerous are licences issued to empower persons to sell certain articles.

In Great Britain the articles not to be dealt in without a licence include beer, cider, wines and spirits, tobacco and snuff, patent medicines, gold and silver, game, sweets; besides these there are licences for auctioneers, appraisers, armorial bearings, carriages, dogs, guns, hawkers and pedlars, male servants, pawnbrokers, &c. The net revenue derived from these licences in Great Britain in 1932 was £4,839,580, most of this revenue being furnished by the beer and spirit licences.

Numerous Acts have been passed for the regulation of the liquor traffic as carried on by licence, one of the most important being that of 1828, which has been amended or supplemented by others down to 1921 (for England and Scotland). There are now in force very stringent regulations connected with the sale of intoxicating liquor. For the sale of such liquor an excise licence is necessary, and retailers also require a licence from the licensing justices of their locality.

But the laws affecting liquor licences in England are not quite as in Scotland or Ireland, or even Wales. In England houses are allowed to keep open for a certain time on Sunday, but in Scotland (excluding hotels) they have long been entirely closed on that day, as they are in Ireland and Wales. The permitted hours during which intoxicating liquor may be sold on week days are eight, beginning not earlier than 11 a.m., and ending not later than 10 p.m., or if, owing to special requirements, the justices in any district so direct, eight and a half hours, beginning not earlier than 9 a.m., and ending not later than 10.30 p.m.; in the Metropolis nine hours, beginning not earlier than 11 a.m., and ending not later than 11 p.m.

During Sundays and on Christmas Day and Good Friday the hours are five—two between 12 noon and 3 p.m., and three between 6 and 10 p.m. Selling or supplying liquor to any person in any licensed premises or club except during the permitted hours is forbidden; but exceptions are made in the cases of lodgers, friends of the licence holder consuming liquor on the premises at an entertainment given by him at his expense, traders or clubs purchasing for the purposes of trade or of the clubs, or persons consuming within thirty minutes after the permitted hours liquor supplied to them with a meal within the permitted hours, &c.

Licensed places of refreshment, where the consumption of intoxicating liquor is merely ancillary, may have an extension of one hour on week days for the supply of liquor at meals. The English Act of 1904 dealt more especially with the giving of compensation by 'the trade' to persons deprived of their licences, except on certain grounds.

LICHEN, in medicine, is the name given to a disease of the skin. It is characterized by the appearance of conical or flat papules over any part of the body, but most frequently on the forearms, thighs, or neck. In the acute stage these papules have a typical lilac colour, but in the more chronic forms the spots tend to run together to form patches.

The papules may disappear rapidly or persist for months, and according to the duration their site is marked by less or more pigmentation of a rich brown colour. In treatment diet should be attended to, and arsenic or mercury administered internally, with the external application of some tar or carbolic preparation.

LICHENS, a very extensive order of cryptogamic or flowerless plants. They are not simple plants, but are Fungi associated with Algæ, the two being mutually dependent. They have neither stem nor leaves, but consist of a *thallus* varying much in form and texture. They are reproduced by spores pertaining to the fungus of the particular lichen, usually an Ascomycete; also by *soredia,* clumps of alga-cells entangled in fungus hyphæ.

The Iceland-moss (*Cetraria islandica*) is also abundant in the Arctic regions.

(*See* ICELAND-MOSS.) Several other lichens afford dyes of various colours, these being chiefly obtained from rocks in the Azores and Canaries. Litmus is also obtained from a lichen.

LICHFIELD, a cathedral city, borough and market town of Staffordshire, England. It is 118 miles from London, on the L.M.S. Railway, and is a centre for the sale of agricultural produce. It has breweries and other industries. The cathedral, a magnificent thirteenth- to fourteenth-century pile which was restored in the nineteenth century, has three spires —two on the west, each 180 feet, and one in the centre 280 feet high. The town was the birth-place of Dr. Johnson, to whom a monument has been erected facing the house wherein he was born, where there is now a museum. The Three Crowns is an old inn. The war memorial is a garden of remembrance. The see of Lichfield was founded in A.D. 656. At one time the city had a castle, and until 1885 it sent members to Parliament. Pop. (1931), 8,508.

LICHNOWSKY, Karl Marx, German prince and diplomat. Born 8th March, 1860, he entered the German Foreign Office in 1884, retiring in 1904. In 1912 he was appointed ambassador to Great Britain, and later was much criticized for his failure to preserve diplomatic relations between Great Britain and Germany in 1914. In 1917 he was exiled on the unauthorized publication of his *Meine Londoner Mission*, a criticism of German policy in the Sarajevo incident of 1914. He died 27th Feb., 1928.

LICK OBSERVATORY, on Mount Hamilton (4,209 feet), California, United States; founded by James Lick, a San Francisco millionaire piano-manufacturer (1796–1876), and formally handed over to the University of California in 1888. In order to secure the least possible amount of interference it is surrounded by a belt of untouched land. It possesses a refracting telescope with an object-glass 36 inches in diameter. Next to that of the Yerkes Observatory, this is the largest refracting telescope in the world.

LICTORS, in Rome, were the officers who preceded the chief magistrates, consuls, and prætors to clear the way for them, and cause due respect to be paid to them. They carried axes tied up in bundles of rods, called *fasces*, as ensigns of office, and were selected from the lower class of free men. The dictators were preceded by twenty-four lictors; the consuls, decemvirs, and military tribunes by twelve; the provincial prætors, master of the horse, and proprætors by six; and the quæstors by five. During the firs century of the Empire the empero was attended by twelve lictors, bu Domitian increased the number t twenty-four.

LIDDELL, Henry George, Englis scholar and divine, born 1811, die 1898. Educated at Charterhouse and Christ Church, Oxford, he graduated in 1833. His co-operation with Robert Scott (afterwards Master of Balliol and Dean of Rochester) produced the famous 'Liddell and Scott' *Greek Lexicon*, which was first published in 1843.

In 1846 he was appointed headmaster of Westminster School, and in 1855 became Dean of Christ Church, Oxford, resigning in 1891. The *Lexicon*, which was founded on the Greek-German lexicon of Passow, has also appeared in two smaller forms. It was for Dr. Liddell's daughter that *Alice's Adventures in Wonderland* was originally written.

LIDDESDALE, district of Scotland. It is in Roxburghshire and is the valley of the Liddel Water, a tributary of the Esk. There are border towers in the dale, including Hermitage Castle, and the scenery is most picturesque. The Armstrongs and the Elliotts, famous border families, lived here.

LIDDON, Henry Parry, English divine, born 1829, died 1890. He graduated from Christ Church, Oxford, 1850, and while there he became acquainted with Pusey and Keble. He became vice-principal of the Theological College, Cuddesdon (1854–9), and in 1864 was appointed prebendary of Salisbury Cathedral. His Bampton Lectures (1866) were afterwards published as *The Divinity of Jesus Christ*.

In 1870 he became a canon residentiary at St. Paul's, and Ireland professor of exegesis at Oxford. He resigned this professorship through ill-health (1882). His works include: *University Sermons* (1865), *Some Elements of Religion* (1872), *English Church Defence Tracts*, and the posthumous *Life of Pusey* (4 vols., 1893–7).

LIDO. *See* VENICE LIDO.

LIE (le), **Jonas Lauritz Edemil,** Norwegian novelist, born 1833, died 1908. He chose the sea as a profession, but owing to weak eyesight he was compelled to give it up. After studying at Christiania he became a lawyer. In 1868 he abandoned the law and went to Christiania to support himself by literary work.

In 1870 he was very successful with a novel entitled *The Visionary*. His subsequent works include: *The Three-Master 'Future,' The Pilot and his Wife, Forward! Life's Slaves, The*

Commandant's Daughters, and *Two Lives*. His chief works have been translated into English.

LIE, Marius Sophus, Norwegian mathematician, born 1842, died 1899. He was appointed to a professorship in Christiania in 1872, and succeeded Klein at Leipzig in 1886, but was subsequently induced to return to Christiania. Lie stands high on the list of the score or so of great mathematicians of the nineteenth century, and a very considerable part of the tremendous advances made in mathematical science during the last fifty years must be put to his credit. Among his works are: *Theorie der Transformationsgruppen* (1888–93) and *Vorlesungen über Differentialgleichungen* (1891).

LIEBIG (le'bi*h*), **Justus, Baron von,** German chemist, born at Darmstadt 1803, died at Munich 1873. From 1825 he was ordinary professor of chemistry at the University of Giessen, a chair he held for twenty-five years. In 1850 he replaced Professor Gmelin at Heidelberg, and in 1852 he accepted the chemistry chair at Munich. The Munich Academy of Sciences elected him president in 1860.

He did much to improve methods of analysis; his *Chemistry of Food* inaugurated more rational methods of cooking and using of food, and he invented the extract of meat which is called after him; while agriculture owes much to his application of chemistry to soils and manures. The Grand-Duke of Hesse created him an hereditary baron, and he received many honours from universities and learned societies. — BIBLIOGRAPHY: A. W. von Hoffmann, *The Life-work of Liebig*; W. A. Shenstone, *Justus von Liebig: his Life and Work*, 1083–1873.

LIEBKNECHT, Karl, German Socialist, born 1871, died 1919. The son of Wilhelm Liebknecht, he practised at Berlin as a barrister, and was sentenced to eighteen months' imprisonment for the publication of a pamphlet entitled *Militarism and Anti-Militarism* (1907). Elected to the Reichstag (1912), he disclosed the Krupp scandals (1913), bitterly opposed the European War, and was called to a labour battalion (1915).

In 1916 he was expelled from the Reichstag and sentenced to two and a half years' penal servitude, degradation, loss of civil rights, &c., for 'treason,' through his organization of a May Day demonstration. On appeal the sentence was extended to four and a half years, but he was released under the political amnesty (Oct., 1918), when he joined Rosa Luxemburg and directed the Spartacist rising, during which he was arrested and accidentally shot.

LIEBKNECHT, Wilhelm, German Socialist, born 1826, died 1900. During the revolutionary period of 1848 he was exceedingly active, attempted to form a Republic of Baden, and retired to London, where he became acquainted with Karl Marx. On his return to Germany (1861) he became editor of the *Norddeutsche Allgemeine Zeitung* (1862), and was several times banished and punished for opposing Bismarck. While in jail he was elected to the Reichstag (1874). He edited *Vorwärts* (1890), and was finally imprisoned (1895) for *lèse-majesté*.

LIECHTENSTEIN, a small principality consisting of Schellenberg and Vaduz, formerly fiefs of the Holy Roman Empire. Until 1918 it formed a portion of the Austro-Hungarian monarchy, but declared complete independence on 7th Nov., 1918, the posts and telegraphs being controlled by Switzerland at the invitation of the principality; the currency also is Swiss. The industries are knitted goods, agricultural produce, and cattle-rearing. The principality has no army. It is governed by a prince and a diet of fifteen members. Area, 65 sq. miles; pop. (1930), 10,213, nearly all Catholics and of Teutonic descent. The capital is Vaduz (pop. 1,715).—Cf. A. Helbock, *Quellen zur Geschichte Vorarlbergs und Liechtenstein*.

LIÉGE, a town of Belgium, capital of the province of Liége, and magnificently situated on the Meuse, is one of the principal manufacturing towns of Belgium. It produces big guns, firearms, motor-cars, machine tools, and metals; coal has been worked near the town, and textile industries are prominent. The buildings include the cathedral, the palais de justice, and the museum. There is a university and a broadcasting station (243·7 M.).

History. From the eighth century it was always recognized as a bishopric (principality) and a direct fief of the Church, the ruler being the Prince-Bishop of Liége, and this was continued until the Treaty of Lunéville in 1801. In 1468 the town was sacked by William the Bold, duke of Burgundy, de la Marck, and other plunderers of that time. Marshal Boufflers bombarded it in 1691, and the duke of Marlborough took it in 1702. In 1795 France included it in the department of the Ourthe, but restored it to Belgium in 1815. It is essentially the Walloon capital. During the European War Liége was attacked by German forces on 5th Aug., 1914, but did not capitulate until the 7th, and

the last forts were not reduced until the 16th of Aug. Pop. (1931), 165,657. —Cf. Sir Walter Scott, *Quentin Durward*.

LIÉGE, PROVINCE OF. Area, 1,500 sq. miles; pop. 976,895.

LIEGNITZ (lēh'nits), a town of Silesia, Prussia. It has many historical buildings, and manufactures machinery and hardware, pianos, gloves, woollens, cottons and linens, and hosiery. Pop. 73,123.

LI'EN (Fr. *lien*, bond, from Lat. *ligamen*, band), in law, in its most usual acceptation, signifies, 'the right which one person, in certain cases, possesses of detaining property placed in his possession belonging to another, until some demand which the former has is satisfied.'

In Great Britain liens are of two kinds: (1) *particular liens*, that is, where the person in possession of goods may detain them until a claim, which accrues to him from those *identical* goods, is satisfied; (2) *general liens*, that is, where the person in possession may detain the goods, not only for his claim accruing from them, but also for the general balance of his account with the owners.

LIERRE (lē-ār; Fl. *Lier*), a town and railway junction of Belgium, in the province of Antwerp, at the confluence of the Great and Little Nèthe. It manufactures linen, woollen, silken, and cotton fabrics and lace. During the European War Lierre, an outerring fort, was bombarded by the Germans in Oct., 1914, in the fighting which preceded the fall of Antwerp. Pop. (1931), 28,043.

LIEUTENANT, a military officer next below a captain. A lieutenant in the navy is the officer next in rank to a lieutenant-commander. A naval lieutenant of eight years' seniority, or a lieutenant-commander, ranks with a major in the army, a lieutenant of under eight years' seniority with a captain.

LIEUTENANT, LORD, of a county, in Great Britain, an officer appointed by the Crown, the permanent and chief local representative of the sovereign. The office is supposed to have been instituted about the reign of Henry VIII. He appoints a certain number of deputy-lieutenants, subject to royal approval; he also nominates persons for service as justices of the peace for the county, the latter being also sub-deputy lieutenants. He may also recommend for first commissions in the reserve forces. He is *ex officio* a member of the County Council.

LIEUTENANT-COLONEL, in the British army, is the officer junior to a colonel, and senior to a major. He may have actual command of a regiment or battalion, and is responsible for the discipline, training, and comfort of the troops under his command, and for the various details of their organization. A major can become a lieutenant-colonel by brevet as a reward for good service. Brevet rank confers army, but not regimental rank, i.e. the officer takes rank in his regiment according to his seniority as major, but outside it according to the date of his brevet. A captain and brevet-major may also receive a brevet of lieutenant-colonel. In conversation or in unofficial correspondence the word brevet is omitted. A brevet does not carry pay of rank.

LIEUTENANT-GENERAL, a general officer in the army, ranking above a major-general and below a general, equivalent to the naval rank of vice-admiral.

LIFE is a term applied to the distinctive attribute of all plants and animals, and the mysterious motive force that impels them to grow and develop, display a variety of activities, and reproduce their kind. It is difficult to define, because we are unable to comprehend what it is and how it originated; all that we can do is to study its manifestations and attempt to interpret their meaning, an occupation which has engaged the attention of mankind for more than sixty centuries, and even, perhaps, ever since the human family came into existence and attempted to explain the meaning of the living world around them.

There are reasons for believing that the earliest members of the species *Homo sapiens* in Europe, the so-called Crô-Magnon race which left its remains in the Upper Palæolithic deposits of France, Britain, and elsewhere, regarded blood as life, an idea which is expressed in the Old Testament. According to this belief, life was the red substance the loss of which caused unconsciousness and death. But at a later stage, when it was realized that a living creature could die without any loss of blood, the new view was propounded that the breath was life, and that the purpose of respiration was to convey the vital stuff to the heart and the blood.

The fact that the inundation of the Nile made the desert fertile and infused vitality into the apparently dead seed started yet another theory, that water was the vital substance; and this was applied to animals when it was supposed that the life of a new creature was produced by the introduction of water (semen) into the mother, or, as the ancient Assyrian

and Hebrew word expresses it, by irrigating her. This ancient Egyptian theory was adopted more than twenty centuries later by the Ionian philosopher Thales, and made the basis of his speculations.

This persistent study of the nature of life by early man was not inspired merely by scientific curiosity or the joy of speculation, but by the purely selfish and practical aim of life insurance. Before man fully appreciated the fact that death was the inevitable fate of all, he was continually striving to discover the means of preserving his life and his youth, as men and women still do. But in early times men firmly believed that if they could add to their vital substance by means of some *elixir vitæ* or some life-giving amulet, they might rejuvenate themselves or retain their youth and virility, or ward off the danger to life by injury or disease, or prolong their existence even when death seemed to have destroyed their bodies.

The investigation of the claims for the origin of life by spontaneous generation led Pasteur to make discoveries upon which the modern theory of the causation of many diseases is founded. It provided Lord Lister with the data for his views which made possible the wonderful developments of modern surgery, which have saved countless thousands of human lives. But the refutation of the crude ideas of spontaneous generation that prevailed in the Victorian era merely shut off one avenue of approach to the solution. Many writers, following Lord Kelvin (1871), have attempted to remove the question out of the field of practical investigation by putting forward the claim that living matter was introduced on to the earth from some planet, because it is a fundamental principle of mundane conditions that 'dead matter cannot become living without coming under the influence of matter previously living.' But this merely evades the issue.

The success of modern chemists in building up synthetically many organic compounds previously known only as the result of vital activities of some plant or animal has to some extent opened the way for a more sharply defined attack on the nature of life. Chemists are now able to produce very complex organic compounds, in some cases with a very near approach to vital material. But the living properties of the substances of animals and plants depend on what the chemist calls 'labile molecular unions,' and these are found not only in living structures but also in inorganic colloids.

The term 'colloid' was introduced nearly sixty years ago by Thomas Graham, because one of the most typical of this group of substances is gelatine (Gr. *colla*, glue). He recognized the close relationship of colloids to the phenomena of life. All the known properties of colloids can be traced to feeble molecular affinities between large groups of molecules or solution aggregates, amongst which there is a balance of the play of energies in the most delicate equilibrium, analogous to that of a living organism. It is difficult to exaggerate the importance of Graham's work and his clear vision of its significance.

Professor Benjamin Moore sums up the problem of the origin of life in these words: "If a mental picture be conjured up of a world in which there is as yet no life, but where conditions are suitable for life to appear . . . inorganic colloids must first develop, and in time one of these must begin to evolve, not a living cell, not anything so complex as a micrococcus or a bacillus, not even a complex protein, carbohydrate, or fat, but some quite simple form of organic molecule, holding a higher store of chemical energy than the simple inorganic bodies from which it was formed.

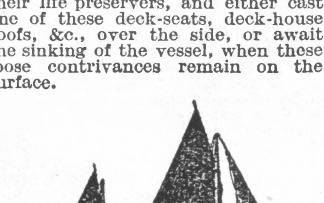
Every living organism consists of one or more cells; and the body of one of the higher animals is an assemblage of countless millions of such units, which are so co-ordinated and have their functions so integrated that they form an harmoniously working organism. Each of the living cells of which it is composed itself consists of a combination of colloids in dynamic equilibrium, carrying on an exchange of energy with one another and with their environment. — BIBLIOGRAPHY: A clear and simple account of this highly complex subject is given by Benjamin Moore, *Origin and Nature of Life* (1912), where a concise bibliography will also be found. For early speculations on the nature of life *see* G. Elliot Smith, *The Evolution of the Dragon*.

LIFE-BELT, or **LIFE PRESERVER**, a device for the saving of life at sea, consisting of blocks of cork stitched in canvas, carrying shoulder-straps and strings for securing the belt when in use. Those supplied to the Royal Navy weigh 5 lb., have a buoyancy of 20 lb., and are capable of supporting one man.

LIFE-BOATS may be of two distinct types, either those carried on board ship for emergency purposes, or those housed in stations around the coasts of Britain, France, and the United States, but both are maintained primarily for the saving of life at sea. In cargo steamers sufficient life-boat accommodation is

easily provided for all hands, but in passenger vessels the problem of boat-deck space does not permit of the provision of boat space for all, consistent with convenience in launching, general comfort upon normal occasions, and rapidity of action in time of emergency.

Regulations based upon the lessons taught by the sinking of the ill-starred *Titanic* in April, 1912, have been in force for some time, and make provision for the equipment of all passengers with life-preservers, and their accommodation upon loose deck superstructure which is fitted with beckets and made adaptable as rafts. Those who are unable to find a seat in one of the boats merely adjust their life preservers, and either cast one of these deck-seats, deck-house roofs, &c., over the side, or await the sinking of the vessel, when these loose contrivances remain on the surface.



The Blyth Motor Life-boat. By permission of the Royal National Life-boat Institution

It is compulsory for ships of a certain size to carry one or more motor life-boats fitted with wireless.

The Board of Trade fully recognizes the Fleming oarless (hand-lever propelled) life-boat. Nesting, or placing a smaller life-boat within a larger one, is sometimes resorted to aboard ship, with the idea of saving space. Steel boats with special joints, forming frames, such as the Mechan, are eminently adaptable to this form of storage. Submarines and craft that are invariably cramped for head-space are frequently equipped with *Berthon boats*, devices of canvas and collapsible struts, resembling slightly the coracle of the ancient Britons.

Station life-boats, some 250 in number on the British seaboard, are controlled by the Royal National Life-boat Institution, founded in 1824, and supported entirely by voluntary contribution (42 Grosvenor Gardens, London, S.W.1).

The old sail-and-oar method of life-boat construction is gradually being supplemented by motor propulsion. A station lifeboat differs very much from an ordinary cabin cruiser, or, indeed, from any other kind of small craft. She is intended for use in heavy seas, and must, therefore, possess great strength, buoyancy to an exceptional degree, and the power of ejecting automatically the incoming water.

'Thews and sinews' are ensured by laying the planking on the double-diagonal system, in two layers, a layer of calico and white lead filling the space between them. Buoyancy is provided by means of tanks and cases filled with air, and stored right round the sides, so that, even when stove in, the combined buoyancy of the undamaged tanks ensures the power to float.

Launching from shipboard is accomplished by means of davits (q.v.) or by a derrick and winch, or donkey-engine, and from the shore through the agency of slipways (the commonest method), or by means of some patent device applicable to a specific station. A list of life-boat stations, &c., will be found in *Brown s Nautical Almanac* (yearly).

LIFE-BUOY, a circular device sometimes made from cork, and frequently constructed of steel divided into compartments. Beckets, or life-lines, are hung around all life-buoys, so that several persons may be supported by them at once.

Night life-buoys usually consist of a yellow-pine cross carrying a hollow copper sphere upon each arm. Galvanized man-ropes radiate from the centre of the cross. The buoy carries a weighted cylinder of 'calcium light,' and when let go into the water, extracting-rods drop out, pulling the socket out of the lid of each calcium light, and allowing the water to enter and ignite the phosphide of calcium. The lead weights keep the cylinder upright in the water, and the flame emanating from the top blazes violently for half an hour, so that rescue work is facilitated. A spirit ration and a whistle are carried in little hollows pierced in one of the globes.

LIFE-RENT, in Scots law, the use and enjoyment for life of a sum of money or an heritable subject, the person enjoying it being called a *life-renter*, the proprietor of the subject the *fiar*, and the subject the *fee*.

LIFFEY, a river of Ireland, rising in the mountains of Wicklow, flowing through Kildare and the county and city of Dublin into the Irish Sea; length, 50 miles. *See* DUBLIN.

LIFTS, ELECTRIC, are operated by direct or alternating currents. The lift cage is suspended by ropes passing over a drum at the head of the shaft, and carrying the balance weights at their other end. The grooved drum is driven by the motor through oil-immersed worm-gearing. Where a direct-current motor is in use a compound-wound field system is adopted for starting, and the series coil is cut out when full speed is attained. The motor is operated by an automatic rheostat set in action by the control-switch within the cage. The motor is fitted with a brake, which is held out of action at all times when running is desired, and is arranged to act immediately if there is any interruption of the electric supply. Safety devices are fitted to prevent the cage continuing in motion to the extreme top and bottom of the lift shaft, and to lock the cage on the guides if the suspending ropes break.

LIFTS, HYDRAULIC. *See* HYDRAULICS AND HYDRAULIC MACHINERY.

LIGAMENT, in anatomy, the strong tendinous, inelastic white bands which surround the joints, and connect bones, or strengthen the attachments of various organs, or keep them together. Every joint is surrounded by a capsular ligament; the tendons at the wrist and ankle are bound down by what are called the annular ligaments. In dislocations of joints the capsular ligament is often broken.

LIGHT is a wave form of energy which is radiated from luminous bodies. It is the agency by means of which the object seen influences the eye which sees it. The object may be self-luminous, as the sun, stars, lamps, the glow-worm, and the fire-fly; or it may reflect or emit in a modified form some part of the light which falls on it, as the moon, the planets, and the various objects round about us. The vibrations of the luminous body are communicated to the ether (q.v.), a medium which fills all space, whether occupied by matter or void, and waves spread out through this medium, travelling at the rate of 186,000 miles per second.

The nature of light has been the subject of various hypotheses. Newton supposed that extremely small corpuscles were shot out in great numbers at very high speed from luminous bodies, that these travelled in straight lines and rebounded from matter with which they collided, and by their mechanical action on the eye caused the sensation of sight. This *emission theory* was, however, not wholly satisfactory, and was discarded in favour of the *undulatory theory.*

Huygens, about 1690, suggested the hypothesis of the luminiferous ether and the propagation of light through it by means of waves. His theory made little progress until the beginning of the nineteenth century, when its truth was established by the experiments of Young, Fresnel, and others. Clerk Maxwell's *electromagnetic theory of light* supposes the waves to be caused by oscillations of electrostatic and magnetic force in directions mutually perpendicular to the direction of motion of the wave and to each other.

In any homogeneous medium light-waves travel in straight lines with uniform speed; the straight line which denotes the direction of motion is called a ray of light. As a consequence of the *rectilinear propagation* of light, when an opaque object is interposed in the path of the light, the space behind the object receives no light, and the object casts a shadow. *Eclipses* of celestial bodies are due to shadows caused in this way (*see* ECLIPSE). The working of a pin-hole camera also depends on the rectilinear motion of light waves. As the light spreads out from a luminous body, its intensity diminishes as the distance from the source increases, and the intensity is reduced to one-quarter when the distance is doubled, or, more generally expressed, the intensity varies inversely as the square of the distance from the source.

Photometry (q.v.) deals with the measurement of luminosities of sources and of the illumination of surfaces by these sources, the units employed being respectively the standard candle and the foot-candle, or the illumination produced by a standard candle at a distance of 1 foot (*see* CANDLE STANDARD). When light falls on matter, it may be reflected, absorbed, or transmitted. The reflection of light by a surface in all directions is called the scattering or diffusion of light, and it is by means of this irregularly reflected light that we see the objects round about us. When light penetrates the surface and undergoes partial absorption, the nature of the light which is emitted determines the colour or appearance of the surface (*see* COLOUR; FLUORESCENCE). When the surface of a body is smooth and polished, it reflects light according to the following laws: the incident and reflected rays are in the same plane as the normal to the surface at the point of incidence; the angle of incidence is equal to the angle of reflection.

Reflection (q.v.) treats of the properties of mirrors, plane, convex, and concave, of the images which these mirrors produce, and their

nature. Light, on passing from one transparent medium to another, is transmitted through the second medium at a different speed and generally in a different direction. The rays undergo refraction or bending at the surface separating the two media. Rays which pass from air to a denser medium, such as water or glass, are refracted towards the normal at the point of incidence. The amount of bending is determined by the following laws: the incident and refracted rays are in the same plane as the normal at the point of incidence; the sine of the angle of incidence bears a constant ratio to the sine of the angle of refraction, for any two media. This ratio is the index of refraction for the media, being about $\frac{4}{3}$ for air to water, and about $\frac{3}{2}$ for air to glass; it is also the ratio of the velocities of light in the two media.

Refraction (q.v.) treats of the transmission of light through rectangular blocks, prisms, and lenses, of the amount of bending which rays undergo on passing through these bodies, and of the images which are formed. Refraction of rays of composite light is accompanied by the breaking up of such light into its constituents, as in the formation of a spectrum.

Dispersion treats of the amount of separation of the different colours caused by different refracting materials (*see* DISPERSION; RAINBOW). The methods of obtaining spectra, the classification of spectra, and the knowledge derived from their study are alike of importance to the physicist, the chemist, and the astronomer (*see* SPECTRUM; SPECTRA, THEORY OF).

The **velocity** of light was measured by Römer, a Danish astronomer, in 1675, from observations of the times of eclipse of Jupiter's moons; Bradley, an English astronomer, determined the velocity by means of the aberration of star-light; and Fizeau, Foucault, and others found its value by using terrestrial distances. When light-waves are reflected to the eye from the upper and under surfaces of a thin film of transparent material, such as a film of oil on water, the two sets of waves arrive at the eye in different phases, and interfere to produce colour if a white light is employed, or bright and dark bands if monochromatic light is used.

Interference (q.v.) includes the study of wave phenomena, of the different methods of producing bands, and their employment in calculating the wave-length of light. The waves of light, being very short in comparison with common magnitudes, are incapable of bending round a corner to any great extent.

The bending or **diffraction** (q.v.) may be observed by looking through a handkerchief at a distant lamp-light, or by looking at the distant light through a lens with a needle immediately in front of it. Diffraction bands are seen surrounding the needle and within its geometrical shadow. Diffraction gratings are employed in the study of particular lines in spectra on account of their high resolving power, in particular the Michelson echelon grating, by means of which the red hydrogen line has been found to be double.

Polarization (q.v.) is an effect observed in light which has been reflected, or which has passed through certain crystals, or transparent media subjected to strain. In a beam of ordinary light the vibrations take place in all directions across the line of propagation of the wave; but in a beam of polarized light the vibrations are confined to a certain mode, and the light may be plane, elliptically, or circularly polarized. Plane polarized light is obtained from crystals and in reflected light. In the first case it is accompanied by double refraction. When a ray of light is incident on a crystal of calcite or Iceland spar, it is broken up into two rays, each of which is plane-polarized.

Physiological or **visual optics** deals with the structure of the eye, its optical properties, and the defects of vision, the methods of testing eyesight, and the use of spectacles.

Light is necessary for the proper growth of plant and animal life. It has also curative properties, as seen in Finsen s successful application of sunlight in the cure of lupus. Light also has an ionizing action on gases, which causes the gas to become a conductor of electricity, so that a charged insulated body loses its charge under the action of the light. This property is confined to the ultra-violet waves, and a similar effect is caused by radium. Another effect is that which takes place in a selenium 'cell'; when light is incident on selenium, it causes the electrical resistance of the latter to fall to a small fraction of the value which the resistance has when unilluminated. This property has been employed in the optophone, an instrument intended to enable blind people to read an ordinary book (*see* PHOTO-ELECTRICITY).

Another connection between light and electricity was established by the experiments of Hagen and Rubens (1903), which show that the electrical conductivity of a metal may be deduced from a knowledge of the reflecting power of the metal for light.

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Heath, *Geometrical Optics*; R. W. Wood, *Physical Optics*; E. Edser, *Light for Students*; R. A. Houstoun, *A Treatise on Light*.

LIGHT, ARTIFICIAL, any kind of illumination used when and where the natural light from sun or moon is unavailable.

Some form of artificial light must have been in use for domestic purposes from the very earliest times, but though large cities and a high state of civilization existed among the Egyptians, Greeks, and Romans, the systematic lighting of streets was unknown to them. From the writings of Libanius, however, who lived in the beginning of the fourth century after Christ, we may conclude that the streets of his native city, Antioch, were lighted by lamps, and Edessa, in Syria, was similarly illuminated about A.D. 500.

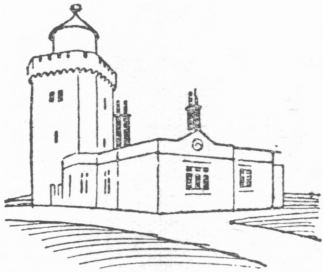
Of modern cities Paris was the first to light its streets. In the beginning of the sixteenth century it was much infested with robbers and incendiaries, so that the inhabitants were ordered, in 1524, to keep lights burning after nine in the evening, before all houses fronting a street. In 1558 *falots* (large vases filled with pitch, resin, and other combustibles) were erected at the corners of the streets.

In London the inhabitants were instructed to hang out candles in 1668. A more definite order was issued in 1690. Every housekeeper was required to hang a light or lamp, every night, as soon as it was dark, between Michaelmas and Lady Day, and to keep it burning till the hour of twelve at night. Successive Acts of Parliament and orders of the common council provided from time to time for the better lighting of London. The Hague commenced street lighting in 1552, Hamburg in 1675, Berlin in 1679, Copenhagen in 1681, Vienna in 1684, Hanover in 1696, Leipzig in 1702, and Dresden in 1705.

The application of coal-gas to economical purposes by Murdock in 1805 opened a new era in artificial lighting. For street lighting in cities gas had no competitor for many years, but the introduction of the ordinary electric arc lamp, and its later modifications with magazine for carbons and the flame arc, changed the outlook, and led to thorough investigations of street illumination by means of photometers. The nitrogen-filled metallic filament lamp has now almost entirely replaced the arc lamp. *See* ELECTRIC LIGHT; GAS MANUFACTURE; LAMP; &c.

LIGHTFOOT, Joseph Barber, Bishop of Durham, born at Liverpool in 1828, died 1889. Educated at King Edward's School, Birmingham, and Trinity College, Cambridge, he graduated in 1851 as senior classic, and became a tutor of Trinity College. He was successively Hulsean professor of divinity, examining chaplain to the Archbishop of Canterbury, Canon Residentiary of St. Paul's, and Lady Margaret professor of divinity at Cambridge. In 1879 he was translated to the see of Durham.

A Biblical scholar of the first rank, Bishop Lightfoot took an important part in the revision of the authorized version of the New Testament. His works include commentaries on the *Galatians*, *Philippians*, *Colossians*, and *Philemon*, and volumes of sermons.—Cf. B. F. Westcott, *Bishop Lightfoot*.



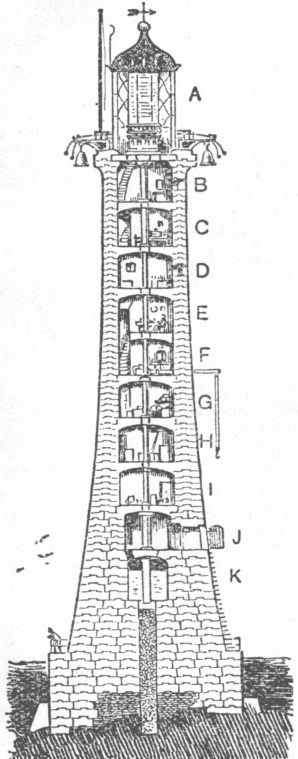
South Foreland Lighthouse

LIGHTHOUSE, a tower or other lofty structure with a powerful light at the top, erected at the entrance of a port or on some rock or headland, and serving as a guide or warning of danger to navigators at night. The Pharos of Alexandria, founded about 300 B.C., is the earliest building erected expressly as a lighthouse of which we have any authentic record. Lighthouses are supposed to have been erected by the Romans at Flamborough Head, Dover, and Boulogne.

In modern times the first important lighthouse erected was the Tour de Cordouan, at the mouth of the Garonne in France, founded in 1584 and completed in 1610, altered and improved in 1727. The first sea-light on the British coasts, for which a toll was leviable, was that of Dungeness, for which letters patent were granted by James I shortly after his accession.

Until about 1676 nearly all the lighthouses were provided by private persons; subsequently they began to be built by the corporation known as Trinity House, and an Act passed in 1836 empowered the corporation to purchase all private lights. By the Merchant Shipping Act, 1854, the

supervision of the lighthouses passed into the hands of the Board of Trade, Trinity House being the administrative body for England and Wales, the Commissioners of Northern Lighthouses for Scotland and Isle of Man, and the Commissioners of Irish Lights for Ireland. The light dues vary between £300,000 and £400,000 annually.



Vertical Section of Eddystone Lighthouse. A, Lantern. B, Service room. C, Bedroom. D, Low light room. E, Living-room. F, Crane- and store-room. G, Store- and coal-room. H and I, Oil-rooms. J, Entrance. K, Water tanks

At first burning wood provided the light, but later was superseded by fires of coal exposed in open chauffers upon the top of a tower. When oil was first introduced as an illuminant is not known. An immense improvement in lighting was made a few years previous to the French Revolution by the introduction of parabolic reflectors, which concentrate and throw forward in a horizontal direction the rays of light proceeding from lamps placed in their foci. At the same time the revolving frame carrying the lamps and reflectors was introduced. This mode of lighting is termed the **catoptric** or **reflection** system. It is so called in opposition to the *dioptric* or *refracting* system, in which the illumination is produced by a central lamp, the rays from which are transmitted through a combination of lenses by which it is surrounded.

The adoption of lenses in lighthouses, though suggested as far back as the middle of the eighteenth century, was first carried into practical effect in 1819 by M. Augustin Fresnel (q.v.). The advantages which this system possesses over that of reflectors has led to its adoption in most lighthouses. Fresnel also combined the two systems, the apparatus consisting of a number of rings of glass of various diameters, arranged one above another in an oval form. The middle rings form a cylindrical lens through which the rays from the central lamp are transmitted by **refraction** while the other rings or prisms are constructed in such a manner as to project by **reflection** the light from the focus in a direction parallel with the refracted rays. The light thus obtained is termed the **catadioptric** light.

A modification of the dioptric and catadioptric systems was introduced by Thomas Stevenson under the designation of the **holophotal** system, its object being to effect the useful application of the *whole* of the light. The lantern of a lighthouse is shown in the figure. As the revolving system is of great weight, a mercury float is employed to relieve the load on the engine or motor.

A lighthouse must have some mark by which it can be distinguished from any other in its neighbourhood. Distinguishing marks (*characters*) in common use are: fixed light; flashing light, showing one flash at intervals of a few seconds; group-flashing lights, showing two or more flashes in quick succession, followed by a longer period of darkness; and occulting lights, which show a fixed light and are eclipsed for a few seconds at regular intervals. A system of alternate flashes and eclipses (on the Morse alphabet principle) has been in some cases adopted to mark particular lights. Coloured lights, red and green, are also used with any of the foregoing characters to produce further distinctions, but in general only to mark danger arcs, or in conjunction with a white flash, as the tinted-glass

shades seriously impair the power of the light, the colour of which, moreover, is not easily distinguishable in foggy weather. To produce the various characters requires the use of a revolving apparatus bearing the lenses. To give great illumination tiers of superimposed lenses, each with a separate burner in its focus, are in some cases employed.

Oil, particularly mineral oil, is employed in plain wick burners or with incandescent mantles. Gas has been substituted for oil in some lighthouses; oil-gas and acetylene are successfully employed in illuminating buoys for the guidance of vessels. Oil-gas buoys are charged to a pressure of perhaps ten atmospheres, giving a continuous light for three or four months. The electric light has been adopted for a number of lighthouses, notably at the Isle of May, the Lizard, and Isle of Wight.

The Eddystone and Bell Rock are the two most celebrated British lighthouses. The former was first built (of wood) in 1703. A second structure was burned down in 1755. A third, built by the famous engineer John Smeaton, was completed in 1759. The illustration shows a section of the present Eddystone lighthouse, built by Sir J. N. Douglass in 1882. The manner in which the stones lock to one another is shown. The lamp is 133 feet above high-water level, and below it are the living-rooms, oil and general stores, and water-tank. Other important lighthouses on the British coast are those of Skerryvore and the Dhu Hartach, both on the western coast of Scotland; the Wolf Rock Lighthouse at the entrance to the English Channel; that of the Bishop Rock off the Scilly Islands; and the Chickens' Rock Light south of the Isle of Man.

LIGHTNING, a flash of light resulting from a sudden discharge of atmospheric electricity. It may be a diffused reddish-white or violet flash, seemingly spread over a considerable extent of the sky (**sheet lightning**), or a **zigzag** or rather sinuous line of very brilliant light, resulting from a discharge between two clouds or between a cloud and the earth. **Heat lightning** is unaccompanied by thunder; it is now generally held to be the reflection from aqueous vapour and clouds of a discharge occurring beyond the horizon. Sometimes during a thunderstorm **globe lightning** is seen, the flashes taking the appearance of balls of fire falling slowly enough for the eye to follow their movement.

Experiments show that the duration of a flash of lightning is inconceivably small, in some cases not more than a millionth part of a second. Certain electroscopic experiments seem to show that previous to a discharge between two clouds internal discharges are taking place in both. Lightning in passing through air and non-conductors, metallic rods, &c., exhibits all the phenomena of the passage of a very great quantity of electricity; it kills animals, splits trees and stones, and melts thin wires.

Thunder is due to the sudden disturbance of the air produced by a lightning discharge; the long rolling effect is perhaps due to echoes from the clouds, perhaps partly to there being a number of discharges at different distances from the observer. Sound travels at ordinary temperatures about 1,100 feet per second, so that a thunder-clap from a distance of one mile would reach us in about five seconds. *See* CONDUCTOR, ELECTRICITY.

LIGHTNING ARRESTER, a device installed in the central- and substations of electricity supply schemes, and also on electric railway trains and tramcars, to protect the insulation of the plant from destruction by the action of the abnormal pressures due to lightning. They provide a suitable path to earth for these charges. In some cases the path consists of one or more air-gaps, with a carbon resistance in series. When the line becomes charged, the pressure is sufficient to jump the air-spaces on the gaps, and the main supply follows through the arcs produced. These arcs must be immediately broken, and the carbon resistance, keeping down the current, assists in this way, but a magnetic blow-out is customary. The principle of this action is the deflection of the current-conveying arc by a magnetic field.

LIGHTNING-CONDUCTOR. *See* CONDUCTOR.

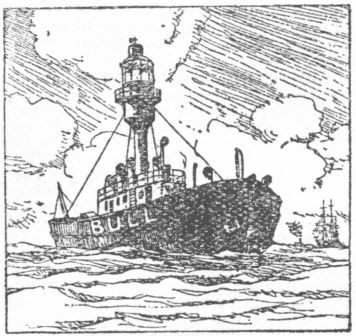
LIGHTS, in public worship. Light in Scripture is frequently referred to as a symbol of the Divine Presence, and in the rituals of the Jews and early Christians candles and candlesticks, or lamps, played an important part. Candles were lighted during the reading of the gospel, at baptisms, at funerals, and round the tombs of martyrs. This ceremony was forbidden to be practised in cemeteries by the Council of Elvira, A.D. 305, but it was continued in the churches not only for the persons buried within their walls, but for all who made provision for its observance on the anniversary of their death. The Feast of the Purification was popularly called Candlemas, on account of the numerous lights employed in its ceremonies.

In the Roman Catholic Church

lights are kept burning during the celebration of Mass. Candlesticks, and sometimes candles, are placed on the altar in many English churches, *See* RITUALISM.—Cf. Vernon Staley, *Studies in Ceremonial.*

LIGHT-SHIP, or **LIGHT-BOAT,** a vessel, usually single-masted, serving as a lighthouse in positions where a fixed structure is impracticable. A lantern, fitted with Argand lamps placed in the foci of parabolic reflectors, is built on the masthead.

LIGNITE, or **BROWN COAL** (q.v.), compressed and altered vegetable matter intermediate in qualities between peat and coal. It occurs chiefly in the Cainozoic strata in many Euro-



Light-ship

pean countries, occasionally in thick beds, as in Germany and France, and is much used as fuel in Central Europe.

LIGNY (lēn-yē), a village of Belgium, not far from Charleroi. It is famous for the battle fought here between the French under Napoleon and the Prussians under Blücher, 16th June, 1815. Napoleon was victorious. *See* QUATREBRAS; WATERLOO.

LIG'ULA, or **LIG'ULE,** in botany, a strap-shaped petal of flowers of the ord. Compositæ; also the membrane which occurs at the base of the lamina of a grass leaf, and the tongue-shaped outgrowth from the base of the leaf of Selaginella and some other Lycopods. Hence the term *ligulate,* applied especially to the ray florets of Compositæ.

LIGUORI (lig-ų-ō'rē), **Alphonso Maria de,** Italian prelate and founder of the Redemptorists, born 1696, and died 1787. In 1732 he founded a monastery, the members of which formed the Order of the Most Holy Redeemer. He was made bishop by Clement XIII (1762), and retired in 1775. He was beatified in 1816 canonized in 1839, and created a doctor of the Church in 1871.

LIGURIA, one of the chief maritime compartimenti (divisions) of modern Italy, embracing the provinces of Genoa and Porto Maurizio, and including the towns of Spezia, Genoa and S. Remo. Area, 2,097 sq. miles; pop. (1931), 1,436,958.

In the third century B.C. Liguria became a Roman province, was occupied by the Lombards in the seventh century, and partly fell to the House of Savoy in 1388. In the thirteenth century the present compartimento formed the Republic of Genoa.

LIGURIAN REPUBLIC. From 1797 to 1805 the Republic of Genoa existed as the Ligurian Republic, under a democratic Constitution granted by Bonaparte. In 1805 the republic was annexed to France, and from 1814 to 1860 formed part of the Kingdom of Sardinia.

LIGURIAN SEA, an arm of the Mediterranean, between Corsica and the Ligurian mainland. The northern extremity is the Gulf of Genoa.

LI HUNG CHANG, Chinese statesman, born in 1823, died in 1901, first distinguished himself by the suppression of the Taiping rebels (1863), in which he was assisted by 'Chinese' Gordon. He was subsequently Viceroy of the metropolitan province of Chihli, was also made Superintendent of Trade, and practically conducted the foreign policy of China. He arranged treaties with Peru and Japan, and one with France on the conclusion of the Franco-Chinese War in 1886. In 1895 he represented the emperor in the negotiations at the end of the war with Japan. The following year he travelled through Europe and the United States. The Boxer movement was successfully handled by him.—Cf. Sir R. K. Douglas, *Li Hung Chang.*

LILAC (*Syringa vulgaris,* nat. ord. Oleaceæ), a familiar fragrant-flowered shrub, 8 to 10 feet high, is a native of South-Eastern Europe and Asia, and was introduced into Britain some 300 years ago under the name pipe tree.

LILBURNE, John, political agitator and writer of pamphlets, born 1614, died 1657. For his attacks on the Church and on Cromwell he suffered many times at the hands of the law, and became something of a popular hero. Hume describes him as "the most turbulent, but also the most upright and courageous of men."

LILIA'CEÆ, the lilies, a large natural order of monocotyledons. They are stemless herbs, or shrubs with a simple or branched trunk, with bulbous or fascicled roots. They have

six hypogynous or perigynous stamens, with usually introrse anthers; a three-celled ovary, each cell being usually many-ovuled; an entire style; and a capsular fruit. The lily, fritillary, hyacinth, Star of Bethlehem, tulip, dragon-tree, squill, aloe, onion, and garlic belong to this order.

LILLE (lēl; Fl. *Ryssel*), a town of France, capital of the department of Nord, near the Belgian frontier, and formerly in French Flanders. It is one of the chief manufacturing towns of France, and the chief fortress of the north-east. The Haute and Basse Deûle, sluggish streams, traverse the town, and are connected by a canal, while the country around is so flat that for about 1½ miles it can be laid under water.

The manufactures include linen and cotton thread fabrics, fine woollen cloth, velvets, and carpets. The factories of Lille cover almost the whole range of textile goods. Chemicals, leather, machinery, paper, and beet-sugar are also produced. It has a broadcasting station (265·4 M., 1·3 kw.).

The buildings are mainly modern, although on the Grande Place are the Grande Garde and the Bourse, both ancient. The city has a university with fine buildings and a Pasteur Institute.

History. Founded in the eleventh century, Lille originally belonged to the Counts of Flanders, but eventually came under the domination of Burgundy, Austria, and Spain successively. In 1667 it was taken by Louis XIV, and was fortified by Vauban. After a siege of several months it was reduced by Eugene and Marlborough in 1708, but was restored to France by the Peace of Utrecht in 1713. In 1792 it was ineffectually besieged by the Austrians. During the European War Lille was declared an open town (24th Aug., 1914), and it was occupied by German troops on 2nd Sept. They quitted it on 5th Sept., but bombarded the city on 11th Oct., and re-entered it on the 13th. Lille remained in German possession till 17th Oct., 1918. Pop. (1931), 201,568.

LILLIBULLE'RO, originally, it is said, a watchword of the Irish Roman Catholics in their massacre of the Protestants in 1641; afterwards, the refrain and name of a political song, composed in or about 1687, which became popular among supporters of William III.

LILLO, George, English dramatist, born 1693, died 1739. He is chiefly remembered for his play *The London Merchant, or the History of George Barnwell,* a *bourgeois* tragedy with a moral attached. He adapted the partly Shakespearean play *Pericles,* and wrote a new play on the subject of *Arden of Feversham.*

LILY, a genus of plants, nat. ord. Liliaceæ. The root is a scaly bulb; the leaves simple, scattered, or verticillate; the stem herbaceous, simple, and bearing at the summit very large and elegantly formed flowers. The flower consists of six petaloid sepals, the calyx and corolla being alike in form and colour.

Species. There are many species, those best known in Europe being the white, orange, and scarlet lilies, the tiger lily, &c. The common white lily (*Lilium candidum*) is a native of Syria, Persia, and other Eastern countries. The finest American species is the *L. superbum,* which grows in marshes to the height of 6 or 8 feet, bearing reflexed orange flowers spotted with black. A well known Japanese lily (*L. auratum*) is one of the noblest flowering plants in existence, and highly fragrant. *L. giganteum* grows to the height of 12 feet.

LILY-OF-THE-VALLEY (*Convallaria majālis*), a plant of the nat. ord. Liliaceæ, distinguished for its beautiful fragrant bell-shaped flowers. It is found in Europe, Asia, and North America. The flowers, generally white, form a terminal unilateral raceme on a curved stalk.

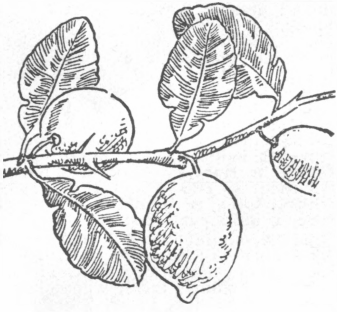
LIMA, capital city of Peru, founded by Francesco Pizarro in 1535, lies at the foot of granite hills, on the intermittent stream Rimac, whose name was corrupted into Lima. The port is Callao, 7 miles distant. The city shows the usual chess-board form, but has more of an old Spanish aspect than Buenos or Santiago. What appear to be substantial houses are only of brick, adobe, or timber. The University of Lima is the oldest in the New World; there are many churches and convents, and a very large bull-ring. Lima is connected with Callao by both steamer and rail. It has some manufactures, and is the trading centre of the Republic. Pop. (1931), 272,742.

LIMBOURG, or **LIMBURG,** a province of Belgium, separated by the Maas from Dutch Limburg; area, 930 sq. miles; pop. (1931), 373,228. Hasselt is the capital. Pop., 22,602.

LIMBURG, a province of the Netherlands, partly intersected by the Maas; area, 846 sq. miles; population (1931), 566,916. Agriculture and cattle-rearing are the chief occupations, and there is a large export trade in butter and cheese. The capital is Maastricht. Before 1839 Limburg, with Limburg, Belgium, formed the duchy of that name.

LIMBURG, a city of Hesse-Nassau, Prussia, known as Limburg-on-Lahn. The cathedral dates from the tenth century, but has been restored. During the European War Limburg had an internment camp. Railway rolling-stock and cloth are manufactured. In the Middle Ages Limburg existed as a town (Electorate of Trèves), and passed to Hesse-Nassau in 1803. The *Limburger Chronik* is an important historical work on fourteenth-century Rhineland. Pop., 8,600.

LIME, CaO, the oxide of the metal calcium. It does not occur free in nature, but in the form of salts is widely distributed, more especially as the carbonate $CaCO_3$ (*see* CALCITE and LIMESTONE). The pure oxide is obtained when Iceland-spar or finest marble is heated to bright redness in



Lime

an open vessel. Combined with carbonic, sulphuric, and phosphoric oxides it constitutes large rock masses, and even mountains; as sulphate or carbonate it is present in sea and other waters in solution; it is a constituent of good soils and of a great number of minerals; and is the essential foundation of the hard parts of animals and of certain algal plants.

Ordinary lime, or quicklime, is manufactured on a large scale by burning chalk or limestone. The operation is conducted in brickwork kilns, the lumps of limestone being mixed with coal or other combustible material. Lime readily absorbs both moisture and carbon dioxide from the atmosphere, and should be kept in air-tight tins.

Pure lime is a soft, white substance, of the specific gravity of about 3·18. It is quite infusible except at the temperature of the electric furnace, but when heated in the oxyhydrogen blowpipe it becomes white-hot and incandescent. When water (1 part) is added to quicklime (3 parts) it is rapidly absorbed, with the evolution of much heat and vapour. This constitutes the phenomenon of slaking. The heat proceeds from the combination of the water with the lime, forming *hydrate of lime* or *calcium hydroxide*, $Ca(OH)_2$, which is a white powder containing 75·7 parts of lime to 24·3 parts of water.

The hydroxide is sparingly soluble in cold water, but still less soluble in hot; the saturated solution at the ordinary temperature contains 0·14 per cent. of the hydroxide, and is known as *lime-water*. This solution is astringent and somewhat acrid in taste, has a distinct alkaline reaction, turning red litmus blue, and rapidly absorbs carbon dioxide from the air, yielding a precipitate of calcium carbonate. When raised to a bright red heat, slaked lime is decomposed into water and calcium oxide. Chlorine combines directly with lime, forming the very important substance, used in bleaching, called *chloride of lime* or *bleaching-powder*. It is formed by passing chlorine gas over slaked lime. Chloride of lime is also used as a disinfectant.

Uses. The uses of lime are very numerous. In the manufacture of basic Bessemer steel (*see* STEEL) it combines with phosphorus and other impurities and forms about one-half of what is called 'Thomas slag,' which, when ground, makes a cheap and efficient fertilizer; it is employed in the early stages of leather dressing to remove hair, fat, &c., from the hides; it is used in metallurgy as a flux; for neutralizing acids; for making all varieties of mortars and cements; in agriculture for manurial purposes, the main effects being due to its rapid conversion into the soluble calcium bicarbonate in the soil; in the chemical laboratory as a drying agent; for decomposing ammonium salts and generating ammonia; and in the *materia medica*, chiefly as an antacid.

LIME, or **LINDEN** (Tilia, nat. ord. Tiliaceæ), a large tree, with alternate, simple, and cordate leaves, and sweet-scented flowers, disposed on a common peduncle. The common linden (*T. europœa*) is a well-known tree. The inner bark of all the species is very tenacious; it is called *bast*, and mats are made of it in Russia in large quantities. The wood is rather soft, close-grained, and much used by turners. The American lime, or basswood (*T. americāna*), is also a large and beautiful tree.

LIME (*Citrus medica, acida*), a small globular-shaped lemon, the fruit of a shrub about 8 feet high. It is a native of India and China, but was introduced into Europe long be-

fore the orange, and is now extensively cultivated in the south of Europe, the West Indies, and some parts of Southern America. The fruit is agreeably acid, and its juice is employed in the production of citric acid, and in beverages.

LIMEHOUSE, district of London. It is on the north side of the River Thames in the borough of Stepney. It is largely inhabited by sailors and there are several docks in the district. It has also a large Chinese population. There are several homes and institutes for seamen. **Limehouse Cut** connects the Rivers Thames and Lea.

LIM'ERICK, a seaport, capital of Limerick County, Irish Free State; on the Shannon at the head of the estuary. It consists of three parts: English town (on King's Island), Irish town, and Newtown Pery (modern). The principal buildings are the episcopal cathedral of St. Mary, the Roman Catholic cathedral of St. John, and a castle built by King John. Limerick is the leading port on the west coast for the shipment of dairy produce. It was the last stronghold of King James at the Revolution; and the treaty stone, near Thomond Bridge, still marks the spot where the famous Treaty of Limerick was signed in 1691. Pop. (1926), 39,690.

LIMERICK, county of Munster, Irish Free State; area, 661,573 acres. The principal river is the Shannon, the estuary of which forms much of the northern boundary, the county being watered by the Maigue, Deel, and Mulkear. Pasturage and dairy farming are general, and large quantities of farm produce are exported. Pop. (1926), 100,895.

LIMESTONE, is one of the various forms in which calcium carbonate (carbonate of lime) occurs naturally. The crystallized natural forms of the carbonate are calcite and aragonite (q.v.). When pure, it has the composition $CaCO_3$, or 56 parts of lime to 44 parts of carbon dioxide. Most varieties of limestone are highly impure, and contain magnesium carbonate, silica, alumina, and iron compounds. They are comparatively soft and can be scratched with a knife, and all, except highly magnesian varieties, effervesce when a drop of dilute acid or vinegar is added. When pure, the rock dissolves completely in dilute hydrochloric or nitric acid.

Limestone belongs to what are termed the sedimentary rocks, and for the most part owes its origin to the deposition of the remains of sea organisms on old ocean beds. In many cases well-preserved marine shells and skeletons of marine organisms are found embedded in the limestone (*fossils*). Limestones are very common, and form enormous rock masses on the surface of the earth.

As a rule limestone has a crystalline texture and occasionally a granular appearance. Different specimens vary considerably in colour and also in specific gravity, namely, from 2·5 to 2·9. A mixture of carbonate of calcium with dolomite (calcium magnesium carbonate) is frequently met with, and is known as *dolomitic* or magnesian limestone. A variety of very fine-grained compact limestone is used in lithography, the best being that obtained near Pappenheim and Solnhofen, in Bavaria.

Varieties of limestone are: (1) *Chalk*, a white earthy rock, which occurs in thick beds in the south of England, and which consists in large part of the remains of minute sea organisms known as foraminifera; (2) *Oolite* or roestone, a white or yellow granular rock mass, which forms part of the Jurassic beds of the Midlands and eastern portions of England. *See* LIME; CHALK; GEOLOGY; &c.

LIMIT, in mathematics, a fixed value to which a variable approximates as closely as may be required. As an example, let a variable take in succession all values which have the form of the reciprocal of a positive integer, i.e. the values $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots$. In this case the limit of the variable is 0; for the nth value is $1/n$, and this and all succeeding values differ from 0 by less than any assigned number if we make a suitable choice of n; e.g. $1/n$, $1/(n+1)$, $1/(n+2)$, . . . are all less than $1/10^6$ if n is 10^6+1. A precise definition of *limit* is given, with ample illustration, in works on the calculus (q.v.).—Cf. F. F. P. Bisacre, *Applied Calculus.*

LIMITATION, in English law, a certain time, assigned by statute, within which an action must be brought, varying according to the subject of action. This matter is regulated by certain Acts of Parliament, called Statutes of Limitation. According to those now in force, actions are limited as follows: actions for the recovery of land, rent-charge, or redemption of mortgages, to twelve years after right accrued; of debt or covenant, if founded on a deed, to twenty years, on less formal agreement, to six years after breach; bills, promissory notes, trade accounts, arrears of rent or dower, to six years.

Actions for slander are barred after two years; actions on penal statutes, if brought by the party injured after two years, if brought by a common informer after one year. Actions by

the Crown relating to land are limited to sixty years. An action for assault, battery, &c., must be brought within four years, an action for death by accident within one year. In a charge of murder the injured person must have died within a year and a day of the time when the injury was inflicted.

These limitations do not apply to prosecutions for crime, which may be instituted at any time, nor do they apply to actions against a trustee for any fraud or fraudulent breach of trust to which the trustee was privy, or for the recovery of trust property retained by the trustee or converted to his own use. If the person to whom a right of action has accrued is under disability, e.g. infancy or insanity, or if the person against whom it has accrued is at the time beyond the seas, the general rule is that the period of limitation does not begin to run until the disability has ceased or the absentee has returned, but the utmost limit in actions relating to land is thirty years, however many disabilities there may be. The American law is mainly based on the English statutes. For the law of limitation in Scotland *see* PRESCRIPTION. The term limitation is also applied to those words in a deed or will which define or 'limit' the extent of the interests given by it.

LIMITED LIABILITY COMPANIES. A feature of recent years has been the rapid growth in the number of companies incorporated with limited liability. The statute law concerning such companies is embodied mainly in the Companies (Consolidation) Act, 1908. By virtue of that Act no association of more than ten persons can be formed for the purpose of banking, or of more than twenty persons for the purpose of carrying on a business for gain unless registered under the Act, or formed in pursuance of another statute of letters patent, or engaged in working mines within the Stannaries. Seven persons may, however, register themselves as a company.

The Act deals with three kinds of companies: (1) unlimited companies, (2) companies limited by guarantees, and (3) companies limited by shares. The first mentioned are extremely rare, as each member is liable for the whole debts of the company (as in an ordinary partnership), but only during the period of his membership and for one year thereafter. Of the second class there are also few examples. The liability of each member is limited to the amount which he has undertaken to contribute to meet the liabilities of the company in the event of a winding-up, and continues so long as he remains a member and for a further year. The third class is of utmost importance and freque The members' liability is limited tc amount (if any) remaining un upon the shares held by them. If shares are fully paid, there is further liability, however deeply volved the company may be.

A registered company is a corpo body, capable of entering into c tracts, and of suing and being sue its corporate capacity, having p petual succession and a common s and with power to hold lands. It *persona* or being distinct from persons composing it, who may cha from time to time without affect the legal *persona* of the company. 'nationality' is determined by place of registration irrespective the nationality of the members.

Companies limited by shares divided into two classes—'public' a 'private.' The latter class of co pany is defined by the above Act a the Companies Act, 1913, as one whi by its Articles (*a*) restricts the right transfer its shares; (*b*) limits t number of its members (exclusive persons who are in the employment the Company, and of persons wh having been formerly in the emplo ment of the company, were while such employment and have continue after the determination of such er ployment to be members of the con pany) to fifty; and (*c*) prohibits an invitation to the public to subscrib for any shares or debentures of th company.

A private company has certai privileges denied to a public company Thus, for example, it need not hav more than two members; it need no file with the Registrar of Joint Stock Companies a prospectus or statemen in lieu thereof or an annual balanc sheet; and it can commence business immediately on incorporation without waiting until a specific minimum number of shares have been subscribed and the directors have paid on their qualification shares the cash due on application and allotment.

Fully 75 per cent of the companies incorporated with limited liability are private companies. The advantages of conducting business through this medium are numerous and well-recognized. For example, there is the paramount consideration of the limitation of liability for debts, already referred to. Then again, facilities for borrowing are increased —debentures or debenture stock secured on the company's undertaking may be issued, or advances may be obtained on security of the amount unpaid on the shares (the 'uncalled capital'); further capital is more easily obtained owing to the limita-

tion of liability, as in the event of adversity only the capital invested can be lost; the business is more readily carried on or disposed of in the event of death; new members are assumed by the simple method of issuing or transferring shares, &c.

A company is incorporated by filing with the Registrar of Joint Stock Companies in London, Edinburgh, or Dublin, a Memorandum of Association and (generally, and, in the case of a private company and one limited by guarantee, always) Articles of Association, along with certain subsidiary documents. The Memorandum and the Articles must be signed by seven (if the company is a private one, two) persons, who must each subscribe for at least one share. These signatories are members of the company, and must be entered in the Register of Members as such. Any person—bankrupt, married woman alien, or infant—may sign.

The Memorandum of Association is the charter of the company, and too great care cannot be exercised in its preparation. By law it must contain the following particulars:

(1) The name of the company, which must not so resemble that of another company as to be likely to deceive, and which must end with the word 'Limited' (but this may be dispensed with by the Board of Trade if the company is not carried on for gain). The name may be changed by special resolution and with consent of the Board of Trade.

(2) The part of the United Kingdom where the registered office is to be situated (England, Scotland, or Ireland).

(3) The objects of the company. This is a most important clause, as on it depend the powers of the company, any act not authorized by it being *ultra vires* and null. Extremely wide general powers are always taken, as the 'objects' clause can be altered only in special cases and with the sanction of the court.

(4) A declaration that the liability of the members is limited.

(5) The amount of the nominal capital of the company and its division into shares (unless the company is limited by guarantee and has no share capital). Different classes of shares may be created, e.g. preference, ordinary, and deferred, of different amounts and with different rights both as regards dividends and as regards repayment of capital in the event of a winding-up. The nominal capital may be increased or reduced by resolution, but the confirmation of the court is also necessary to any reduction.

The memorandum of a company limited by guarantee must add a declaration of the undertaking mentioned *supra*.

The Articles of Association are the regulations of the company for the management of its internal affairs. If Articles are not registered, Table A of the Act of 1908 applies; and the table also applies so far as not excluded or modified by any Articles registered. The Articles deal with the powers and duties of directors, calls on shares, transfer and forfeiture of shares, payment of dividends, meetings, voting rights, the accounts, &c. Power to alter the capital must be contained in the Articles before such alteration can be effected. The Articles may be altered by special resolution for the benefit of the company within the powers of the Memorandum.

The business of a company is usually managed by directors. They must not make secret personal profits, nor can they delegate their powers unless authorized by the Articles of Association.

A general meeting of the company must be held annually. An extraordinary general meeting may be called at any time by the directors or by the requisite number of members. Resolutions passed at such meetings may be of three classes: (1) ordinary, for which a bare majority suffices; (2) extraordinary, passed by a majority of not less than three-fourths of the members present in person or by proxy and entitled to vote; and (3) special, passed as an extraordinary resolution and confirmed by a majority at a subsequent meeting held not less than fourteen days nor more than one month thereafter. In cases (2) and (3) previous notice of intention to propose the resolution must have been given to the members. The proceedings at meetings must be minuted, and the minutes, if signed by the chairman of that or the next succeeding meeting, are evidence of the proceedings.

The existence of a company is ended by the process of winding-up. This may be (*a*) by order of the court; (*b*) by the voluntary act of the company; or (*c*) by voluntary act and under supervision of the court. A company need not necessarily be in difficulties in order to wind-up.

Company Law has been considerably altered by the Companies Act, 1928, which amongst other provisions, enacts (1) that every public company shall have at least two directors; (2) that directors cannot contract out of their liability to the company for negligence; (3) that shares may with the consent of the court be issued at a discount; (4) that every person who

offers shares to the public by going from house to house shall be liable on first conviction to imprisonment for a term not exceeding six months or a fine not exceeding £100, or both; and for every subsequent offence imprisonment for a term not exceeding twelve months or a fine not exceeding £500, or both.—BIBLIOGRAPHY: Buckley, *Law and Practice under the Companies Act*; F. B. Palmer, *Company Precedents*.

LIMOGES (li-mōzh; ancient **AUGUSTORITUM LEMOVICUM**), a town of France, capital of the department of Haute-Vienne, and former capital of Limousin. It is a railway junction. The principal building is the cathedral of St. Étienne, commenced in 1273, left partially completed in 1550, and completed between 1875 and 1890; artistic porcelain, known as Limoges ware, is manufactured; it is hard and semi-transparent with a brilliant glaze. There are also wool and cotton spinning-mills, cloth factories, foundries, paper-mills, and extensive shoe- and clog-making establishments. Limoges was originally the capital of the Gallic tribe the *Lemovices*. It has a broadcasting station (293 M., 0·7 kw.). Pop. (1931), 92,577.

LI'MONITE (Gr. *leimōn*, a meadow), a very important ore of iron, varieties of which are bog iron ore and brown hæmatite. It is a hydroxide of a brownish colour, occurring in mammillated or botryoidal masses, and found in all iron-bearing districts. Its frequent fibrous structure is probably due to a tendency to crystallize as göthite (q.v.), with the loss of some of its absorbed water. Its composition is usually near $2Fe_2O_3.3H_2O$, yielding 56 per cent of metallic iron.

LIMPET, a sea-snail which clings to rocks partly by the adhesive powers of its broad disc-like foot.

LIMPO'PO, or **CROCODILE RIVER**, a river of Southern Africa, which rises in the Magaliesberg, Transvaal, near Pretoria, and forms the boundary of the Transvaal for some distance, falling into the Indian Ocean north of Delagoa Bay; length, about 1,000 miles.

LINA'CEÆ, the flax family, a small natural order of polypetalous dicotyledons, those in temperate and southern regions being herbs, while the tropical representatives are trees or shrubs. They are principally characterized by their regular flowers, with imbricate glandular sepals having a disc of five glands outside the staminal tube; the ovary is three- to five-celled, with two ovules in each cell; the albumen is fleshy; the leaves are simple, usually stipulate, rarely opposite.

LI'NACRE, or **LYNACER**, Thomas, English savant, born at Canterbury about 1460, died 1524. Educated at Oxford, he visited Italy, and on his return became tutor to Prince Arthur (son of Henry VII). He was ordained priest (1520), and in 1518 he founded the Royal College of Physicians, of which he continued president till 1524. He made a Latin translation of the works of Galen, a work which was particularly praised by Erasmus. With Grocyn and Latimer, Linacre was the first to teach Greek at Oxford, where Erasmus and Sir Thomas More were among his pupils. He was buried in St. Paul's Cathedral.

LINA'RES, a town of Spain, province of Jaen, the chief town of a district rich in lead-mines. Pop. 40,168.

LINARES, an inland province of Chile; area, 3,969 sq. miles; pop. 119,284. Stock-raising is the main industry.

LINA'RIA, a genus of gamopetalous, dicotyledonous plants of the nat. ord. Scrophulariaceæ. Seven or eight species inhabit Britain, where they are popularly known as *Toad-flax*.

LINCOLN, Abraham, sixteenth President of the United States of America, born in Kentucky 1809, died 1865. On the outbreak of the Black Hawk War in 1832 he joined a volunteer company, and became captain. He opened a country store, was appointed postmaster of New Salem, Illinois, began to study law, and at the same time turned amateur land-surveyor.

In 1834 he was elected to the Illinois legislature, to which he was again returned at the three following biennial elections, and in 1836 he was licensed to practise law. In 1846 he was elected to Congress for the central district of Illinois, and voted steadily with the Anti-slavery party. In 1849, and again in 1858, he made unsuccessful attempts to enter the Senate. On the 16th of May, 1860, the Republican National Convention met at Chicago. Lincoln was nominated as a candidate for the presidency, gaining a majority on several votes and being eventually accorded the appointment unanimously. The Southern States, exasperated at this defeat, and alarmed at the aggressive anti-slavery policy which many of the leading Republicans had embraced, refused to confirm Lincoln's election, and followed one another in secession.

Lincoln was elected in Nov., 1860, and he assumed office on the 4th of March, 1861. On the 4th of February the Southern Confederacy had been constituted, and on the 14th of April Fort Sumter was captured by the Confederates. The events of the Civil

War during the next four years in Lincoln's career belong to the history of the United States. Lincoln's persistence in raising and pouring in fresh troops after every disaster finally enabled the Federal Government to subdue the secession.

The determination of the Northern States to pursue the war to its conclusion on the original issue led to the re-election of Lincoln as President in 1864. The decisive victory of Grant over Lee on 2nd April, 1865, followed by the surrender of the latter, had just afforded the prospect of an immediate termination of this long struggle, when, on the 14th of the same month President Lincoln was shot in Ford's Theatre, Washington, by an assassin named John Wilkes Booth, and died on the following day.—BIBLIOGRAPHY: W. M. Thayer, *Abraham Lincoln, the Pioneer Boy, and how he became President*; J. G. Nicolay, *A Short Life of Abraham Lincoln*; J. A. Sharp, *Abraham Lincoln*; F. S. Paradise, *Abraham Lincoln, Democrat. See also* John Drinkwater's play *Abraham Lincoln* (1918).

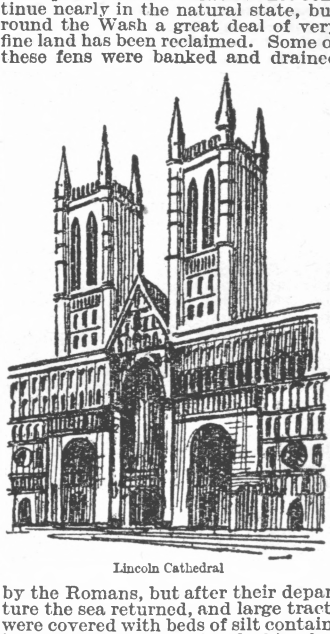
LINCOLN (ling'kon), a city, county, and municipal borough of England and county town of Lincolnshire. The principal building is the cathedral, commenced about 1073, completed in 1092, and restored since 1862, chiefly in the early English, but partly also in later styles, with a tower over 260 feet high, in which is the famous bell known as 'Great Tom of Lincoln,' cast in 1610, cracked in 1827, and since recast into a new bell. Other conspicuous buildings are the Guildhall or Stonebow (of the time of Richard III), the remains of the castle founded by William the Conqueror, the old episcopal palace, and the Roman arch spanning Hermin Street.

Lincoln has been identified with the Roman *Lindum Colonia* (in Bede it occurs as *Lindacolina*). On the departure of the Romans it became the capital of the Saxon kingdom of Mercia, and during the early fourteenth century Parliaments frequently assembled in the town. Pop. (1931), 66,246.

LINCOLN, a city of the United States, capital of Nebraska, and county town of Lancaster. It is an important grain centre, well provided with elevators, and served by three railways. There is a large stockyard and packing-houses. Pop. (1931), 75,933.

LINCOLN COLLEGE, a college of Oxford University founded in 1427 by Richard Fleming, Bishop of Lincoln. The hall was built in 1439, and the chapel in 1631. The existing statutes were enacted under authority of a Parliamentary Commission in 1855. The foundation usually consists of a rector, twelve fellows, and fourteen scholars. It was at Lincoln College that John Wesley started his evangelistic work.

LINCOLNSHIRE, a large eastern maritime county of England; area, 1,705,293 acres. The surface lies generally below the level of the sea, being protected by embankments. In a few places the fens and marshes continue nearly in the natural state, but round the Wash a great deal of very fine land has been reclaimed. Some of these fens were banked and drained



Lincoln Cathedral

by the Romans, but after their departure the sea returned, and large tracts were covered with beds of silt containing marine shells. Lincolnshire has long been celebrated for its breed of horses, cattle, and sheep.

In the best parts of the fens and marsh under tillage the crops chiefly cultivated are oats and wheat. Principal rivers: Trent, Witham, Welland, and Ancholme. The Witham is navigable from Boston to Lincoln; and the county is intersected by an intricate network of canals and dikes. Lincolnshire is divided into three parts—Holland, Kesteven, and Lindsey. Pop. (1931), 624,553.

LINCOLN'S INN, one of the Inns of Court in London. It occupies the site of a house owned by an Earl of Lincoln in the 13th century, between Chancery Lane and Lincoln's Inn

Fields. The Old Hall (1506) was restored in 1927.

Lincoln's Inn Fields was laid out as a square by Inigo Jones. It now belongs to the London County Council. In the centre are some gardens and the buildings around include Sir John Soane's Museum and the Royal College of Surgeons. The Fields cover seven acres.

LINCRUSTA, a stiff decorative sheet, invariably of an embossed type, and often termed Lincrusta Walton from the inventor's name—Walton. It is made from a mixture of cellulose pulp, cork, linseed oil, resin, and the like. The sheets are moulded while the substance is plastic, thus producing high-relief effects. The finished product is of a compact nature, waterproof and durable, and is used as a high-class decoration for walls and panels.

LIND, Jenny, soprano vocalist, born at Stockholm, 1820, and died at Malvern 1887. She made her debut at the Court Theatre, Stockholm, in 1838, studied under Manuel Garcia at Paris, securing an engagement in Berlin (1844) through the influence of Meyerbeer. Her appearance at Covent Garden (1847) was the signal for a scene of unprecedented enthusiasm.

LINDBERGH, Charles Augustus, American airman. Born at Detroit, 4th Feb., 1903, of Swedish descent, he entered the Air Mail Service of the U.S.A. In May, 1927, he became known by his flight across the Atlantic for a prize of £5,000. In a monoplane he did the journey from New York to Paris in 33 hours 50 minutes, the first airman to fly the Atlantic alone. In 1929 Colonel Lindbergh married a daughter of Dwight Morrow, late ambassador to Mexico. The kidnapping of their infant son in 1932 aroused interest all over the world. After a search lasting ten weeks, the child's remains were found in the garden of their house.

LINDLEY, Baron, English lawyer. Nathaniel Lindley was born 29th Nov., 1828, and educated at University College School and University College, London. He became a barrister in 1850 and in 1875 a judge. In 1881 he was made a judge of the Court of Appeal; in 1897 Master of the Rolls and in 1900 a Lord of Appeal and a life peer. He resigned in 1905 and died Dec. 11, 1921. Lindley's book on the law of partnership is the chief authority on this subject.

LINDRUM, Walter, Australian billiards champion. In 1929 he came to England and beat a number of records, notably when he made a break of 3,905 and when he scored 2,572 points in a single afternoon. He is left-handed.

LINDSAY, or **LYNDSAY** (lind-; **Sir David,** an ancient Scottish p and Lyon King-of-Arms, usually c cribed as 'of the Mount,' an est near Cupar in Fife, was born ab 1490, died 1555. After studying St. Andrews, he became page of h our to James V, then an infant (150

In 1528 he produced his *Dreme*, allegory written in the seven-l stanza of Chaucer, and in the follo ing year presented his *Complaynt* the king. In 1530 he was inaugurat Lyon King-of-Arms and knight and in 1531 wrote a drama entitle *Satyre of the Three Estatis*, follow in 1536 by his *Answer to the Kin Flyting*, and by the *History and Tes ment of Squire Meldrum* in 1538. E last work, *The Monarchie*, was finish in 1553.

For more than two centuries Lin say was the most popular poet Scotland. His satirical attacks on t clergy in some degree paved the wa for the Reformation. A complete ed tion of the works of Lindsay was pul lished by George Chalmers in 180 and one by David Laing (with a glo sary by John Small) appeared in 187 in 3 vols.—Cf. T. F. Henderson, *S David Lindsay and the later Scottis 'Makaris.'*

LINDSAY, Sir Ronald Charle British diplomat. A son of the 26t Earl of Crawford and Balcarres, he wa born 3rd May, 1877, and educated a Eton. In 1898 he entered the Foreig Office and gained experience of diplo matic work in Paris and elsewhere From 1913 to 1919 he was Under Secretary for Finance in Egypt. I 1924 he went to Constantinople and in 1926, having been knighted, to Ber lin as ambassador. In 1930 he was transferred to Washington.

LINDSEY, one of the three divisions of Lincolnshire, forming an administrative county under its own county council, and divided into four parliamentary divisions: Louth, Brigg, Horncastle, and Gainsborough. Pop. (1931), 422,181.

LINEN is a term which should be used only for those fabrics made entirely from flax yarns (line or tow). It is not ur usual, however, to hear the term applied to linen-finish fabrics when the latter contain a certain proportion of cotton; such a use of the word is, in reality, a misnomer.

Flax yarn has been spun, and linen fabrics woven from it, in practically every known country in the world, and, prior to the great advance of the cotton industry, formed the chief vegetable material for all kinds of household textures, and for a large proportion of wearing apparel.

The looms for weaving linen differ

r slightly from those used for on and other fabrics, but, on the er hand, flax preparing and spin- g machinery as a whole differs ntially from the corresponding ton machinery because of the at difference in the lengths of the fibres; flax fibres are 2 to 3 feet length, whereas cotton fibres are y 1¼ to 2 inches long. There are newhat similar functions to per- m, however, in corresponding chines for both industries, and in se instances the operations differ ly in detail. (*See* SPINNING; EAVING.)

In these islands the chief centres are lfast and district in Ireland, and nfermline and Perth in Scotland, fine linens, both plain and damask; edium-sett linens are made in north- st of Ulster in Ireland, Leeds, rnsley, and Knaresborough in ngland, and in the east of Fife, otland; while sail-cloth, canvas, id the like are made in Arbroath, undee, Aberdeen, and Leith in otland, and in Dorset and Somerset England.

LING (*Molva vulgāris*), a species of a-fish belonging to the cod family adidæ), and measuring from 4 to 6 et in length. It abounds around the ritish coasts, and is caught with ook and line, and preserved in mmense quantities in a dried state.

LINGAM, among the Hindus, the mblem of the male generative power f nature. It is worshipped either lone or in conjunction with the *yoni* r female generative power. The wor- hip of the lingam alone, or of the ingam and yoni, mark different sects f Saivas.

LINGARD, John, English historian. He was born at Winchester, 5th Feb. 1771, and educated at Douai. He became a teacher in a Roman Catholic college in Durham and there remained until 1811. He died at Hornby in Lancashire, where he had been in charge of a mission since 1831, 17th July, 1851. He refused to become a cardinal.

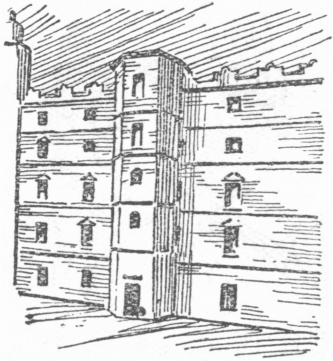
Lingard is known by his *History of England* which takes the story up to 1688. It was very popular, and a new edition, edited and extended to 1910 by Hilaire Belloc, appeared in 1914.

LINGFIELD, town of Surrey, it is 10 miles from Reigate, on the S. Rly. The beautiful collegiate church dates from the 15th century and there is an old prison, now used as a museum. Races are held here. Pop. 4,905.

LINGUA FRANCA, a polyglot form of Italian, used for intercourse among Mediterranean traders in the same way that 'pidgin' English is used in China and on the 'Coast.' Any jargon employed for this purpose is loosely termed a *lingua franca*. *See* MALTA.

LIN'GULA, a genus of lamp-shells (Brachiopoda), belonging to the family Lingulidæ, that has survived with but little change from the Cambrian period. The members of the genus inhabit the Indian Archipelago and the Australasian seas.

LINKÖPING (lin-cheup'ing), a city of Sweden, capital of the lân of Ostergöttland, on the Stång, near Lake Roxen. There is a cathedral built between 1150 and 1499, a fifteenth-century castle, and a library rich in rare editions of the Bible. In its immediate vicinity, in 1598, was fought a battle in which Sigismund was defeated by his uncle, who shortly after became King of Sweden as Charles IX. Pop. (1932), 30,377.



Linlithgow Palace

LINLITHGOW, John Adrian Louis Hope, first Marquess of, was born in 1860, and died 1908. He was the seventh Earl of Hopetoun in the peerage of Scotland, and was made Governor of Victoria (Australia) in 1889, vacating the post in 1895. In 1900 he became first Governor-General of Australia, and was made a Privy Councillor on his return in 1902.

Until 1905 he was Secretary for Scotland and Keeper of the Great Seal of Scotland, and he was elevated to a peerage of the United Kingdom in 1902 with the title of Marquess of Linlithgow. On his death he was succeeded by his son, Victor Alexander John Hope.

LINLITH'GOW, an ancient royal and municipal burgh of Scotland, county town of Linlithgowshire, in a

hollow along the southern bank of Linlithgow Loch. It consists principally of one irregular street, about 1 mile long. Among historical buildings are the palace, now a ruin, where James V and Mary Queen of Scots were born; and the church of St. Michael, a sixteenth-century Gothic edifice. It was in Linlithgow that Hamilton of Bothwellhaugh assassinated the Regent Murray in 1570. The town has leather and paper manufactures. Pop. (1931), 3,666.

LINLITHGOW, COUNTY OF, now **WEST LOTHIAN,** county of Scotland, with 17 miles of seaboard upon the Firth of Forth; area, 76,861 acres. It is one of the richest in minerals of the counties of Scotland, coal, shale, iron, freestone, and limestone being worked.

Karlvon Linne

Oil-refining (shale) is carried on at Bathgate and Uphall. The Almond and Avon are the principal rivers. Linlithgow, Bathgate, Bo'ness, Broxburn, and Armadale are the chief towns. Pop. (1931), 81,426.

LINNÆ'A, a genus of plants of the nat. ord. Caprifoliaceæ (honeysuckles). It contains but one species (*L. borealis*) a creeping evergreen plant found in woods and in mountainous places in Scotland and other northern countries, including North America as far south as Maryland, bearing two beautiful drooping fragrant bell-shaped pink flowers on each flower-stalk. The plant was an especial favourite with Linnæus, and was named in honour of him by Gronovius.

LINNÆAN SOCIETY, a scientific (biological) society of England, with head-quarters at Burlington House, London, instituted in 1788 by Dr. (afterwards Sir) James Edward Smith and incorporated in 1802, for the promotion of the study of botany and zoology. It has an excellent library, a museum, and herbarium, the nucleus of which was formed by the collections of Linnæus himself. Fellows take the initials F.L.S. The society annually awards a gold medal to a botanist or a zoologist.

LINNÉ (lin'nā), **Karl von,** commonly called **LINNÆUS,** Swedish botanist, was born at Rashult, Sweden, 1707, and died at Upsala 1778. The son of a clergyman, he was educated at Wexiö, and showed an early interest in botany. In 1727 he entered the University of Lund, where his botanical tastes were encouraged. In 1728 he removed to Upsala, where he became assistant to Professor Rudbeck and supervised the botanic garden.

His *Bibliotheca Botanica* was published in 1738. He became professor of medicine at Upsala in 1741, and then of botany and natural history. In 1753 he was made a knight of the Polar Star and ennobled. The Linnæan system of botanical classification was paramount until within comparatively recent times. Linné was eminent in all the sciences of his time.

LINNEL, John, English painter, born in London, 19th June, 1792, he turned his attention from portraits to landscapes and engravings. His landscapes are chiefly scenes in Surrey. Examples of his work are to be seen in the National and Tate Galleries, London. He died 20th Jan., 1882.

LINNET, a small singing bird of the finch family, *Linota cannabina.* Its general plumage is brownish, the top of the head and breast being reddish in the breeding season. It is one of the commonest of British birds, everywhere frequenting open heaths and commons, and breeding in the furze and other bushes. They are cheerful and lively birds, and very sweet and pleasing songsters.

LINOLEUM is the name given to an exceedingly useful and durable kind of floor-covering. The foundation for practically all linoleums is some kind of jute hessian cloth, termed linoleum backing or linoleum floor-cloth. These cloths contain from ten to twelve threads and picks per inch, are usually 2 yards or 4 yards in width, and several hundred yards in length; indeed, the length occasionally runs into four figures. For economic reasons it is necessary to have long lengths, otherwise excessive waste would result in the covering of these cloths with the substance which really constitutes the linoleum.

Oxidized linseed-oil and other oily and resinous substances are mixed with ground cork, and this mixture is applied in layers, and by mechanical means, to the surface of the above-

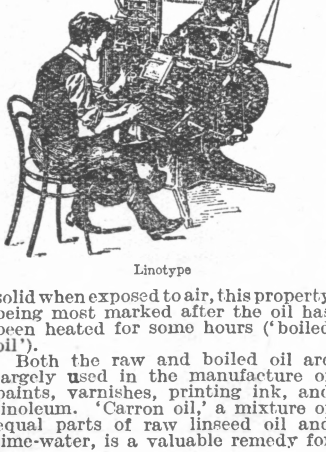
mentioned cloth backing. The thickness of the finished article varies, but, in general, it approximates to ¼ inch.

The so-called wax-cloths and American cloths are somewhat similar in appearance to linoleum (the American cloths being usually of a self-coloured tone or tint), but they are much thinner, have a cotton foundation, and are used to cover tables and to form a light waterproof wrapping for various purposes.

LINOTYPE, a machine used in printing for setting and casting lines of type. It is comprised of a single machine, consisting of a *keyboard* for the operator, a *magazine* containing the moulds—*matrices* as they are called—of the letters, and a pot of molten metal, with apparatus for casting.

This machine is almost universally used in the printing of newspapers.

LINSEED OIL is made from the seeds of the common flax, *Linum usitatissimum*. When pressed cold, an almost colourless oil of edible quality is obtained, with a yield of about 20 per cent. Hot-pressing gives a larger quantity of a yellowish-brown oil which has a peculiar taste and odour. The chief value of linseed oil depends on its conversion to a varnish-like



Linotype

solid when exposed to air, this property being most marked after the oil has been heated for some hours ('boiled oil').

Both the raw and boiled oil are largely used in the manufacture of paints, varnishes, printing ink, and linoleum. 'Carron oil,' a mixture of equal parts of raw linseed oil and lime-water, is a valuable remedy for burns.

LINTHWAITE, urban district of Yorkshire (W.R.). It is on the Colne, 4 miles from Huddersfield, a centre for woollen manufacture. Pop. (1931), 9,689.

LINUM, the flax genus of plants, which gives its name to the nat. ord. Linaceæ. There are about eighty

African Lion

species, herbs or rarely small shrubs, chiefly found in the temperate and warmer extra-tropical regions of both hemispheres. Few are of any importance, except the flax plant (*L. usitatissimum*).

LION (*Felis leo*), a beast of prey of the cat genus, the most majestic of all carnivorous animals, distinguished by its tawny or yellow colour, a full flowing mane in the male, and a tufted tail with a sort of spine embedded in the end of it. The largest lions are from 8 to 9 feet in length. The period of gestation is five months; one brood is produced annually, with from two to four at a birth, and the mother nourishes the cubs for about a year.

The mane of the male lion begins to grow when he is three years old; the adult age is reached about six or seven; and the extreme age is at about twenty-two, although some authorities differ from this estimate. The lion is a native of Africa and parts of Western and Central Asia.

The whole frame is extremely muscular, the fore-parts being particularly so, giving, with the large head, flashing eye, and copious mane, a noble appearance to the animal, which has led to his being called the 'king of beasts,' and to fancies of its noble and generous nature which have no real foundation.

Of the African lion there are several varieties, as the Barbary lion, Gambian lion, Cape lion. The Asiatic varieties are generally smaller and may want the mane, as the maneless lion of Gujrát. The so-called American lion is the puma (*Felis concolor*).

LIONS, GULF OF (Fr. *Golfe du Lion*), so called because of the roaring of its waves; an arm of the Mediterranean washing the southern littoral of France.

LIP'ARI ISLANDS (Rom. *Insulæ Æoliæ*), a volcanic group, comprising seven large islands in the Mediterranean, attached to the Sicilian province of Messina, producing figs, grapes, raisins, and sulphur. The main islands are Lipari, Stromboli, Panaria, Vulcano, Salina, Alicudi, and Filicudi. Lipari, Vulcano, and Stromboli still contain active volcanoes, and Stromboli was the scene of eruptions in 1902 and 1907. Pop. of the group, 22,000.

Lipari, a town on that island, is the group capital and port, and contains a castle built by Charles V, with other relics mainly Grecian and Roman. Pop. about 15,700.

LIPETSK, a town of Central Russia, government of Tambov, on the Voronej. It has sugar-factories, iron-foundries, and chalybeate springs. Pop. 21,000.

LIPPE, formerly a sovereign principality of North Germany, proclaimed a republic, under the title of Freistaat Lippe, Nov., 1918. Area, 469 sq. miles. It lies on the Teutoburger Wald, and is traversed by the Werre, a tributary of the Weser. The principal towns are Detmold (capital; pop. about 14,500), Horn, Lemgo, and Blomberg. The status of principality of the Empire was granted in 1720. As a republic the Constitution is identical, but there is no prince. Pop. (1925), 163,648.

LIPPI, Fra Filippo, Florentine painter, born 1412, died 1469. His most famous pictures are a *Coronation of the Virgin*, painted in 1441 for the nuns of San Ambrogio, now in the Florentine Academy; frescoes on the stories of St. Stephen and John the Baptist, in the Duomo of Prato; and a *Vision of St. Bernard*, in the National Gallery, London. The latter collection also includes an *Annunciation*. There are *Madonnas* in the galleries of Munich and Prato, the Pitti Palace, the Uffizi, and the Berlin Museum.—Cf. E. C. Strutt, *Fra Filippo Lippi*.

LIPPIA, a genus of plants, nat. ord. Verbenaceæ. *L. Pseudo-thea*, a native of Brazil, is aromatic and fragrant, and when dried makes an agreeable tea. *L. citriodora* is the 'lemon-scented' verbena.

LIP READING, understanding the speech of others by observing the movements of lips and tongue, and the facial expression. Some deaf persons employ it instead of watching finger-spelling. It has proved unsatisfactory for the systematic training of deaf-mutes, except in combination with manual methods. The British National Institute for the Deaf recognizes as one of its objects the re-education of the partially deaf through speech-reading. *See* DEAFNESS.

LIPSIUS, Justus, properly **Joest Lips,** a Flemish scholar, born in 1547, died 1606. He was educated at Brussels, and subsequently at Cologne and Louvain, where he was professor of ancient history. His works were numerous, and he rendered important services to the study of the Latin authors, especially Tacitus, Seneca, and Plautus. His *Opera Omnia* appeared at Antwerp in 1585.

LIPTON, Sir Thomas Johnstone, British merchant. Of Irish parentage he was born in Glasgow 10th May, 1850. He began life as an errand boy and about 1865 went to the United States. In 1876 he opened a provision shop in Glasgow. The business prospered; other shops were acquired, and in a few years the firm of Lipton's, Ltd., became one of the largest in the retail provision trade, with interests in Ceylon and elsewhere. In 1898 Lipton was made a knight, and in 1902 a baronet. He died unmarried, 21st Oct., 1931. To the public Lipton was best known as a yachtsman and a liberal donor to the hospitals. He built several yachts, called *Shamrock*, which competed for the America Cup.

LIQUEFACTION OF GASES. Although John Dalton suggested in a paper on *The Force of Steam or Vapour upon Water and various other Liquids* in 1801 that no doubt all gases would be reduced to liquids by the application of low temperatures and high pressures, no gas was liquefied until 1823, when Michael Faraday produced liquid chlorine by the 'mere pressure of its abundant vapour.' Sulphuretted hydrogen, carbonic acid gas, nitrous acid, cyanogen, ammonia, and hydrochloric acid were all liquefied by Faraday later in the same year.

Large quantities of liquid carbon dioxide were made by Thilorier in 1835 by generating the gas in one vessel and forcing it under pressure into another vessel. Solid carbon dioxide was obtained by suddenly releasing the liquid from pressure.

Faraday endeavoured in 1844 to reduce oxygen, nitrogen, and hydrogen to the liquid state, using a bath of solid carbon dioxide and ether to obtain a low temperature and applying pressures of the order of fifty atmospheres. He did not succeed in this, but he added a number of others to the list of condensable gases, and

produced solid ammonia, nitrous oxide, and sulphuretted hydrogen.

Endeavours to liquefy oxygen by high pressure were made by M. P. Berthelot about this time. The pressure used was about eight hundred atmospheres, but no change of state was produced because there was no reduction of the temperature. The failure of other experimenters, notably Natterer, who used about three and a half times that pressure, was followed by the discovery by T. Andrews that every gas has a certain critical temperature above which condensation is impossible, whether the pressure be high or low. Raoul Pictet liquefied oxygen by the use of his system of cascade or closed cycle refrigeration.

L. P. Cailletet also succeeded in producing liquid oxygen about the same time. Z. Wroblewski and K. S. Olszewski worked together in Cracow, and from their early attempts deduced the critical temperatures, then, producing the required conditions, succeeded in liquefying nitrogen, and in 1885 Wroblewksi produced liquid air for the first time.

Sir James Dewar, a successor to Davy and Faraday at the Royal Institution, constructed a plant from which the liquids produced by the condensation of gases could be drawn off. He investigated the magnetic actions of liquid oxygen and ozone.

Dewar invented the vacuum-jacketed vessel known as the thermos flask (*see* LAGGING). The first use to which these vessels were put was as containers for liquefied gases. Hydrogen was made liquid by Sir James Dewar for the first time in 1898, and was solidified by him in the following year.

A few years before hydrogen was liquefied, a substance helium, known to exist in the sun by the spectroscopic researches of Sir Edward Frankland and Sir Norman Lockyer, was shown to exist on the earth by Sir William Ramsay. This substance was found to be a much less condensable gas than hydrogen. Dewar's preliminary experimental work showed that the boiling-point would be of the order of 5° C. absolute. Dr. H. Kamerlingh Onnes succeeded in liquefying helium in July, 1908. Its boiling-point has been determined as about 4° C., its critical temperature as 5° C. absolute. The attainment of these exceedingly low temperatures shows a very close approach to the absolute zero.

Liquefied gases have proved of great value in research work and in some industries. The use of these liquids in creating high vacua, in separating mixed gases by fractional distillation, and in calorimetry is well established. In industry the uses of liquid gases are very limited. The temperatures they give as refrigerators are much lower than those required industrially, which can be cheaply obtained by using more condensable gases.

Liquid gases are too costly and inconvenient to be of any use as sources of motive power. The great use of liquid air is the production of oxygen from the atmosphere by fractional distillation. The nitrogen (q.v.) liberated is made to combine with calcium carbide to produce calcium cyanamide, which is used as a fertilizer. The nitrogen may also be used as the basis for the synthetic production of ammonia and of nitric acid.

This latter industrial use was developed as a national monopoly to an enormous extent in Germany during the European War. One plant alone had a capacity of 100 tons of liquid air per day, which nearly equals the total production in the British Isles.

LIQUEURS (li-keurs'), highly aromatic and generally oily and more or less viscous alcoholic beverages composed of water, alcohol, sugar, and some aromatic infusion extracted from fruits or seeds. Among the best-known liqueurs are: Chartreuse, Kümmel, Maraschino, Curaçoa, Bénédictine, Cointreau, Avocaat, and Crême de Menthe.

LIQUID, one of the three phases of matter. *See* FLUID; HYDROSTATICS; HYDRODYNAMICS; LIQUEFACTION OF GASES.

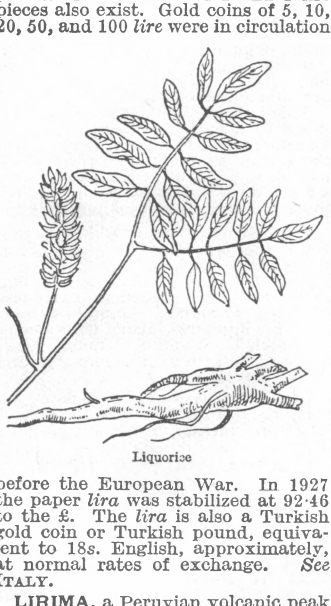
LIQUIDAM'BAR, or LIQUIDAMBER, a genus of trees of the nat. ord. Hamamelidaceæ. They are handsome trees, with lobed shining leaves, and catkins or globular heads of monœcious flowers. The fragrant liquid resin called oil of liquidamber and copal balsam is obtained from the *Liquidambar styraciflua*, found in Mexico and the United States. *L. orientālis* (Oriental liquidambar tree) yields common storax, which is used as a stimulant expectorant.

LIQ'UIDATOR, a person appointed to conduct the winding-up of the affairs of a firm or company. His duty is to realize the assets, to discharge the liabilities to the extent to which the assets permit, and to divide any balance among the parties in right thereof. For these purposes he may bring and defend actions and suits, and do all necessary acts in name and on behalf of the firm or company.

LIQ'UORICE, a name for herbs of the genus Glycyrrhiza, belonging to the nat. ord. Leguminosæ, and growing in Southern Europe, Asia, and

Africa. *G. glabra* is a perennial plant with herbaceous stalks and bluish papilionaceous flowers. The well-known liquorice juice, used as a demulcent and expectorant, is extracted from the root as well as from that of others. *Indian liquorice* is *Abrus precatorius*. *See* ABRUS.

LIRA (plural *lire*; from the Lat. *libra*, pound), Italian standard silver coin, existing in 5, 10, and 20 *lire* pieces. Nickle coins of 1 and 2 lire pieces also exist. Gold coins of 5, 10, 20, 50, and 100 *lire* were in circulation



Liquorice

before the European War. In 1927 the paper *lira* was stabilized at 92·46 to the £. The *lira* is also a Turkish gold coin or Turkish pound, equivalent to 18s. English, approximately, at normal rates of exchange. *See* ITALY.

LIRIMA, a Peruvian volcanic peak in the Tarapacá regions, perpetually snow-capped, and rising to an altitude of about 19,200 feet.

LIRIODEN'DRON, a genus of North American trees belonging to the nat. ord. Magnoliaceæ, and containing only one species, the tulip tree (*L. tulipifera*). *See* TULIP TREE.

LISBON, capital and seaport city of the Republic of Portugal, on the Tagus, is famous for its scenic aspect, and for the catastrophe of 1755, when some 40,000 people were buried under the ruins caused by an earthquake. The new city was rebuilt in large airy streets, and possesses one of the best harbours on the Atlantic. It has a pleasing climate and a fine situation, and is much frequented by foreigners. It is a fishing centre, and has few important manufactures or industries. The river makes a magnificent harbour, well equipped with docks, and considerable business is due to its position as the financial and distributing centre of the Republic. A fine aqueduct carries the city water-supply from springs 10½ miles distant.

The scientific and literary institutions comprise the university (founded 1858), military academy, polytechnic school, and National Library. In addition there are eight theatres and the inevitable bull-ring. A Court of Appeal (Tribunæs de Relaçao) and the Supreme Court have seats at Lisbon, which is also an archiepiscopal see. The Praça de Commercio is the largest of several fine squares.

In 1885 the city annexed the adjacent municipalities of Belem, Alcántara, Pedrouços, and Junqueira. Vasco da Gama, Catherine of Braganza, and the poet Camoens are buried among kings and princes in the Grand Belem Cloister, which is now an orphanage.

History. Lisbon is a place of remote antiquity, its earliest name being *Olisipo*, but *Felicitas Julia* was the Roman title. It was captured by the Moors in A.D. 716 and remained in their possession till 1147. The Visigoths changed the name of the town to *Olisipona*, and the Moors to *Lishbuna*, the present Portuguese name being *Lisboa*. The Portuguese drove out the Moors in 1147, and Lisbon was made the capital city in 1260, rapidly attaining a position as the richest city of Europe, mainly through the discoveries of Vasco da Gama, Pizarro, Orellana (the discoverer of the Amazon), and through the conquest of India.

During the Peninsular War the seat of government was removed to Rio de Janeiro, and Lisbon rapidly degenerated to a residential position among European cities, hastened also by the secession of Brazil. There are two broadcasting stations (31·25 M., 2 kw., and 282·2 M., 2 kw.). Pop. (1925), 529,524.

LISBON, a district of the province of Estremadura, Portugal. Area, 1,062 sq. miles; pop. (1930), 906,582. Cf. G. Young, *Portugal Old and Young* A. F. G. Bell, *Portugal of the Portuguese*.

LISCARD, district of Cheshire. On the River Mersey with a station on the L.M.S. Rly., it is in the county borough of Wallasey. Pop. 16,535.

LISIEUX, a town of Calvados, France, on the Touques. The church of St. Pierre (1045–1233) was a cathedral when Lisieux was a bishopric, and in it Henry II of England was married to Eleanor of Aquitaine. It

has a beautiful lady-chapel, erected by Bishop Pierre Cauchon to expiate his share in the martyrdom of Joan of Arc. The bishopric was withdrawn in 1802. Lisieux was the *Noviomagus Lexoviorum* of the Romans. Pop. 15,362.

LISKEARD, borough and market town of Cornwall, 18 miles from Plymouth, on the G.W. Rly. There is a trade in agricultural produce. Pop. (1931), 4,266.

LISMORE, a cathedral town of County Waterford, Irish Free State, on the Blackwater, where a bishopric and monastery were founded in the seventh century by St. Carthagh, after whom the present cathedral is named. The castle, founded by Prince John (1185), was a seat of the Duke of Devonshire. Pop. 1,474.

LISMORE, an island of Argyllshire, Scotland, at the entrance to Loch Linnhe; area, 15 sq. miles. Lismore was once the residence of the Bishops of Argyll and the Isles, and the choir of the thirteenth-century cathedral is now the parish church. Among other relics are the ruins of two Scandinavian forts. Pop. 357.

LISSA, a town of Posen, Poland, a commerical and industrial centre. It was burned by the Poles in 1656 and by the Russians in 1707. Pop. 17,156.

LISTER, Joseph, Baron, surgeon and scientist, born at Upton, Essex, 1827, died 1912, the title becoming extinct. He graduated at London, 1852, and was professor of surgery at Glasgow from 1860 to 1869, when he became, until 1877, professor of clinical surgery at Edinburgh. In 1877 he transferred to the corresponding chair in King's College, London, and retired in 1893.

He was made a baronet in 1883, created baron in 1897, and was president of the Royal Society (1895–1900), and president of the British Association (1896). He contributed extensively to medical and other journals, and was one of the original recipients of the O.M. (1902).—BIBLIOGRAPHY: Sir R. J. Godlee, *Lord Lister*; and *Six Papers by Lord Lister* (with a biography; 1921).

LISTOWEL, market town and urban district of Co. Kerry, Irish Free State, on the little River Feale, 170 miles from Dublin, on the G.S. Rlys. There are ruins of a castle. The town has an agricultural trade. Pop. 2,917.

The title of **Earl of Listowel** has been borne by the family of Hare since 1822. The earl's eldest son is called Viscount Ennismore.

LISZT, Franz, Hungarian pianist and composer, born 1811, died 1886. He made his début at nine years of age, studied at Vienna and Paris, produced an opera (1825), and became director of the Court Theatre, Weimar, in 1849. He originated the piano recital. In 1861 he took orders at Rome, and was director (1870) of the Conservatoire at Budapest. Liszt's daughter married Richard Wagner, who was considerably helped in his artistic career by the relationship.—Cf. J. Huneker, *Franz Liszt*.

LIT'ANY (from the Gr. *litaneia*, supplication), a term generally applied to a series of short prayers or supplications together forming one whole. The earliest mention of the word in

Lord Lister

connection with Christian services seems to be by Basil in the fourth century, but it was not until the fifth century that litanies came specifically into use. Litanies became afterwards very common, and every saint of the Roman calendar had his litany.

The best-known litany at the present day is that of the Anglican Church. The form now in use was drawn up by Cranmer in 1544. It was constructed with great care, and the chief portion was taken from the *Sarum Rogation-tide* litany. A considerable portion was also taken from the *Consultatio* of Archbishop Hermann of Cologne. It is chanted in the morning service, the priest uttering one prayer, and the people responding with another alternately.—Cf. F. E. Brightman, *Liturgies, Eastern and Western*.

LIT DE JUSTICE (lē dė zhŭs-tēs; literally 'bed of justice,') formerly a solemn proceeding in France, in which the king, with the princes of the blood

royal, the peers, and officers of the Crown, State, and court, proceeded to the Parliament, and there, sitting upon the throne (which in the old French language was called *lit*), caused those commands and orders of which the Parliament did not approve to be registered in his presence. Louis XV held such a *lit de justice* in 1763, to introduce certain imposts, but Parliament resisted, and he was obliged to yield. The last *lits de justice* were held by Louis XVI in 1787 and 1788.

LITERATURE. By literature, in its widest sense, we understand the body of writings produced by all nations and at all periods; all the written documents wherein the human mind has expressed its knowledge, thoughts, and feelings through the medium of language. In a narrower sense, however, the term literature is applied only to such writings which are distinguished by their beauty of form and by the emotional effect which they produce. Such works have the power not only to arouse our interest, but also to stir our emotions.

The question, what is literature and what is not, is a very vexed one. Some literary historians would apply the term literature to every written document, whilst others give the term a much narrower meaning. Matthew Arnold wrote that "all knowledge derived from books is literature," and he also defined literature as "a criticism of life." If by criticism he meant interpretation, then this is the happiest and most concise definition one could wish for. Literature may indeed be rightly defined as "an interpretation of life and nature under various forms of literary art," an interpretation which enables the reader to understand and to appreciate the meaning and beauty of life and of nature.

Literature is the expression, in words, of the human spirit, of its investigations, longings, and aspirations. It is, to some extent, thought about life, but a thought that comes both from the head and from the heart. Deeply rooted in the human breast is the desire of man to express what he feels in line, colour, or sound, in sculpture, painting, music, and poetry. And just like all other forms of art, literature is the record of impressions made upon the mind of the artist.

The author speaks both to our intellect and to our imagination. He puts clearly and vividly before us what is invisible; he interprets for us what we did not understand. Literature concerns itself with life and human activity. But it is not only an interpretation of life, it is also a storehouse of human knowledge. acquaints us with the life of generations; it reflects the intellect moral, and social state of huma in ages bygone; it gives us adequate idea of the degree civilization and culture of a na at some remote period in history

Social forces and political eve are both cause and effect of a nati literature. A history of unive literature is, therefore, not onl history of books, but also a histor the ideas and ideals of humanity. the subdivisions of literature see articles: DRAMA; NOVEL; POETI PROSE, &c.—BIBLIOGRAPHY: C. Gayley and F. N. Scott, *An Int duction to the Methods and Materi of Literary Criticism*; E. H. Lew *An Introduction to the Study Literature*; W. H. Hudson, *An Int duction to the Study of Literatu* Ch. Letourneau, *L'Evolution littéra dans les diverses Races humaines.*

LITH'ARGE, the yellow or reddi monoxide of lead (PbO). It is p pared by exposing molten lead to t atmosphere at any temperature bel 877° C., the melting-point of the oxid As the litharge slag is formed it skimmed off the top, exposing a cle surface to similar action. It is e tensively used in paint manufactu as the raw material in the making red lead, in glass-making and glazin and also as a flux in metallurgic laboratories. *See* LEAD.

LITHERLAND, urban district Lancashire, 5 miles from Liverpoo on the L.M.S. Rly. The Liverpo overhead electric railway also has station here. Pop. (1931), 15,967.

LITHGOW, town of New Sout Wales. It is 100 miles from Sydne by rail and is a mining centre, wit coal, iron ore and shale. There ar some manufactures. Pop. (1931) 15,050.

LITH'IA, Li_2O, the oxide of th element lithium. It is obtained chiefl from the minerals *lepidolite*, a com pound of aluminium silicate with lithium potassium fluoride, and *petalite*, a complex sodium aluminium lithium silicate. The oxide is white and is slowly dissolved by water giving an alkaline solution. The 'lithia' of medicine is a mixture of lithium carbonate and citric acid.

LITH'IUM, an alkaline metallic element; atomic weight, 6·94. The silver-white metal is obtained by electrolysis of the fused chloride. Its specific gravity is about 0·6, which is less than that of any other solid or any liquid. *See* LITHIA.

LITHOG'RAPHY, the art of drawing upon and printing from stone,

the invention of Alois Senefelder, a native of Prague (1771–1834).

The word is derived from the Greek "Lithos" which means a stone and "Graphein" which means to write.

Lithography is a process of printing from stone which has been so treated that the ink will adhere to some parts of the surface and not to others. The whole process depends on two properties of a certain kind of limestone and also the antagonistic qualities of grease and water. The design to be printed is drawn on the stone "in reverse" with a greasy ink, the stone is fixed in the printing machine and gone over with a wet roller. The greasy ink of the design repels the water but wherever there is no design the surface of the stone becomes damp. The stone is then placed under the inking rollers with a reverse effect to what has happened before. The greasy design takes up the ink, the damp surface repels it, and when the stone is placed in contact with paper, an exact impression of the design is given. The materials, instruments, and methods of this art are as follows:

The *lithographic stones*, first used by Senefelder, have proved to be the most suitable for the purpose of lithography. This stone, which is found in the district of Kelheim, Bavaria, is a species of slaty limestone; its colour in the best quality is pale-yellowish drab, and for printing purposes its thickness must be from 2 to 4 inches. In preparing stones for the printer they are squared, levelled, ground, and polished.

Lithographic *ink* is made of wax, white soap, tallow, shellac, mastic, and lamp-black. What are called *chalks* are made from much the same materials, these ingredients being subjected to heat until they are fused, poured out on a slab to cool, and then cut into the required sizes.

There are various styles in which drawings on the stone are executed. *Drawing on the smooth stone* is executed with steel pens and sable-hair brushes. The design, &c., is drawn on the stone in reverse, after which it is slightly etched with dilute acid. In *chalk drawing* the surface of the stone is roughed or grained, after which the drawing is traced upon the stone. The tinting or shading follows. When completed the drawing is etched, after which it is put into the hands of the printer for printing.

The method of drawing directly on the stone has been largely superseded by the use of prepared paper, both grained and smooth, on which the drawing is executed, and afterwards transferred to the stone. *Tinting and chromo-lithography* is much practised in the reproduction of works of an artistic character.

The machines of to-day are mostly direct rotary and rotary off-set. The speed of the machines ranges from 1,600 to 3,000 impressions per hour. The number of good impressions taken from drawings or transfers on these machines can be anything from 20,000 to 50,000. The drawing or writing can also be preserved good on the stone for any length of time by rolling it with black ink and covering with resin and gum. For similar purposes zinc and aluminium are treated in much the same manner as stone. *See* ZINCOGRAPHY; PRINTING; PROCESS-WORK.

LITHOSPERMUM. *See* GROMWELL.

LITHOSPHERE, term used to denote the solid mass of the earth. The lithosphere has an irregular surface and has been divided into an abysmal area where the ocean is over 10,000 ft. deep, a transitional area where the water is under 10,000 ft. in depth, and a continental area forming the land surface.

LITHOT'RITY, in surgery, the operation of crushing a stone in the bladder into fragments of such a size that they may be expelled by the urethra. The instrument by which the stone is broken up is introduced in the same manner as a catheter or sound into the bladder, and after catching the stone either crushes, bores, or hammers it to pieces. The instrument, which is called a lithotrite, has two movable blades at the extremity, which are brought together to crush the stone by means of a powerful screw.

LITHUA'NIA, a republic on the eastern shores of the Baltic Sea, bounded by Latvia, Poland, East Prussia, and the Baltic. It comprises the former Russian province of Kaunas (Kovno) and parts of the former provinces of Gardinas (Grodno), Suwalki, and Courland. In 1923 the Memel territory (area, 1,095 sq. miles, 165 sq. miles being water; pop. 146,000) was awarded to Lithuania by the Council of Ambassadors.

The total area of the state is 21,489 sq. miles and the population (1932), 2,392,983. Lithuania, however, claims part of Vilna province (area, 11,513 sq. miles; pop. 983,000), which was assigned her by Russia in 1920 but which was given to Poland in 1923 by the Council of Ambassadors.

The Poles have occupied Vilna since 1920. Many efforts have been made to settle this dispute, and the matter has been tackled by the League of Nations. No settlement has, however, been reached. Vilna is the real

but Kaunas (Kovno) is the temporary capital. Other towns are Gardinas (Grodno) and Klaipeda (Memel), which is the seaport of the country.

Production and Industry. Lithuania is mainly an agricultural state, 49·6 per cent of the area being arable and the chief crops being rye, oats, barley, wheat, potatoes, and flax. Dairying is important. Forests (mainly pine) cover 2,542,627 acres. Much peat is produced.

Commerce. The total value of exports in 1931 was 273,119,100 litas, and of imports 277,959,100 litas. Exports, mainly timber and agricultural products, go to Germany, Britain, and Latvia, while imports come largely from Germany.

Currency and Communications. The currency unit is the gold *litas*, value about one-tenth of the American gold dollar. There are 1,050 miles of railway track, and great construction schemes are being carried out. Navigable water-ways (including the River Niemen) extend to 2,840 miles. There are 9,738 miles of road.

Religion, Education, etc. Roman Catholicism is the chief religion except in Memel, where the Protestants are in overwhelming majority. Education is well advanced, and there is a university at Kovno. Military service is compulsory; the entire army strength in 1932 was 20,255, all ranks. There is also an auxiliary force of 52,000 men.

History. In early times Lithuania was a grand-duchy. Yagello of Lithuania became King of Poland (1386), but Polish influence increased till in 1569 the Lithuanians were forced to unite with the Poles. In the partitions of Poland, Greater Lithuania fell to Russia (1776), and Lithuania Minor was annexed by Prussia.

In 1917 a Lithuanian State Council was elected at Vilna, and in 1918 the independence of the country was proclaimed. The Constitution of 1922 proclaims Lithuania to be a democratic republic governed by a President, a Premier, a Cabinet, and a Diet (*Seim*). Lithuania is a member of the League of Nations. In 1926 military officers overturned the government, and appointed a new President who was re-elected in 1932.—BIBLIOGRAPHY: *The Economic and Financial Situation of Lithuania* (annual); *The Statistical Year-book*; E. J. Harrison, *Lithuania, Past and Present.*

LITMUS, or **LACMUS,** a purple colouring-matter obtained from *Roccella tinctoria* and other lichens. The substance is used as an indicator (q.v.) for the presence of acid or alkali in solution. Paper tinged with a dilute solution of the substance, or a drop of the substance placed in solution to be tested, is immediately turned blue if alkali be present.

LITOMERICE, modern name of the city once known as Leitmeritz (q.v.).

LITTLEBOROUGH, a town of Lancashire, practically a suburb of Rochdale. The chief industries are cotton manufacture and coal mining. Pop. (1931), 12,181.

LITTLEHAMPTON, a seaport and watering-place on the River Arun, Sussex. The sands and bathing are good, and there are golf links. The river is crossed by a ferry and a bridge. There is a little shipping. Pop. (1931), 10,181.

LITTLEPORT, town of Cambridgeshire, on the Great Ouse, 5 miles from Ely, on the L.N.E. Rly. The main industry is marketing the fruit and vegetables that are grown in the district. Pop. 4,467.

LITTLE ROCK, a city and capital of Arkansas, United States. It stands on a rocky bluff, rising about 50 feet above the river, and has several important educational institutions, including Philander Smith College for coloured students. Pop. (1930), 81,679.

LITTLETON, village of Middlesex, 3 miles from Staines. The Metropolitan Water Board has one of its largest reservoirs here, opened 1925.

LITTLETON, Thomas, born at the beginning of the fifteenth century, died 1481. He was a judge of common pleas under Edward IV, and his work on *Tenures*, written originally in Norman-French, with the commentary of Sir Edward Coke, was at one time the principal authority on the property laws of England.

LITTRÉ, Maximilien-Paul-Émile, French philologist, born 1801, died 1881. In 1862 he published his *Histoire de la Langue française*. His chief work, a dictionary of the French language (*Dictionnaire de la Langue française*), was completed in 1877. Its success was prompt and complete. In 1871 he was elected to the National Assembly, in 1875 was named Senator for life, and next year was admitted a member of the French Academy. Among his works are *Médecine et Médecins* and *Littérature et Histoire*.

LIT'URGY (Gr. *litourgia*, 'public service,') a special series of prayers, hymns, pieces of Scripture, or other devotional matter, arranged and prescribed for use in worship; or in a narrower sense a prescribed service for the celebration of the eucharist; hence in the Roman Catholic Church equivalent to the Mass or service contained in the *Missal*. A number of ancient liturgies are connected with

places or names of persons, but until the fifth century there seems to have been no written liturgy.

The chief liturgical books in the Roman Catholic Church are the *Missal* and the *Breviary* (q.v.), both in Latin. In 1523 Luther drew up a liturgy, or form of prayer and administration of the sacraments, which in many points differed but little from the Mass of the Church of Rome. He did not, however, confine his followers to this form, and every country in which Lutheranism prevails has its own liturgy. Calvin prepared no liturgy; but his followers in Geneva, Holland, France, and other places drew up forms of prayer, of which the Genevese and the French are the most important.

In England before the Reformation the public service of the Church was performed in Latin, and different liturgies were used in various districts. The most celebrated of these were the *Breviary* and *Missal secundum usum Sarum* (that is, as used at Salisbury), compiled by the Bishop of Salisbury about 1080. The English *Book of Common Prayer* dates from the reign of Edward VI. (*See* COMMON PRAYER.) It was based on the Roman *Breviary*.

In the portions of Scripture contained in the *Prayer Book* the authorized version was afterwards adopted, except in the *Psalms*, which are according to *Coverdale's Bible*. This last revisal (that of 1662, the result of the so-called Savoy Conference) introduced some rather important alterations and additions, and brought the *Prayer Book* practically to its present shape, though certain changes in the lessons, &c., received parliamentary sanction in 1871 and 1872.

The *Book of Common Prayer* (with certain alterations made after disestablishment) is used by the Irish Church, and also by the Episcopal Church in Scotland (but a special communion office is used in some of the Scots churches).

The Established Church of Scotland (Presbyterian) has no liturgy, the *Directory for the Public Worship of God* comprising only certain general rules for the conduct of public worship. The *Book of Common Prayer* of the Protestant Episcopal Church in the United States was adopted in 1789 with some minor deviations from the English.—BIBLIOGRAPHY: J. M. Neale, *Essays on Liturgiology and Church History*; F. E. Brightman, *Liturgies, Eastern and Western*.

LITVINOFF, Maxim, Russian politician. He was a Jew named Findelstein before taking his present name. He joined the Communist Party in Russia and worked for it in London where he was engaged for a time as a journalist. He became one of the leaders of the Soviet and in 1918 was sent to London as its representative. Soon, however, he was obliged to leave the country, and he then represented his country in Sweden and Norway. In 1930 he was made Commissioner for Foreign Affairs, and as such took part in several international conferences.

LIUKIU ISLANDS, Chinese name of the Ryukyu Islands (q.v.).

LIUTPRAND, or **LUITPRAND,** historian and prelate, born about A.D. 920, died about 972. From page of King Hugo of Italy he rose to be Chancellor under Berengarius, and was appointed Bishop of Cremona by Otho of Germany. Employed as an Ambassador on several important missions, he had an excellent opportunity of studying the events of the period.

Besides an interesting narrative of a mission to Constantinople, he has left us a *History of Otho*, and his *Antapodosis*, a history of Europe in six books, from 886 to 950.

LIVER, the largest gland in the human body, weighing from 50 to 60 oz. avoirdupois. This gland is not confined to the Vertebrate animals, all of which—save the Amphioxus or lancelet—possess a well-developed liver, but is found in many Invertebrata.

In man the liver is part of the alimentary apparatus, and is situated just below the diaphragm on the right side, extending across the middle line of the body towards the left side. Its front border reaches just below the border of the chest when the posture is sitting or standing; but when the person lies down the liver passes slightly up so as to be completely under cover of the ribs, except a small portion which extends beyond the lower end of the breast-bone. From its position it is extremely liable to compression and injury.

In its general form the liver is flat, broad, and thick towards the right side, becoming narrow and thin towards the left side. Its upper surface is convex or arched and fits into the concave surface of the diaphragm, whilst its lower surface is irregularly divided into certain 'lobes,' five in number, and separated by clefts or fissures. These lobes are known as the right, left, spigelian, caudate, and quadrate lobes.

When microscopically examined, the entire mass of the liver is found to consist mainly of large many-sided cells containing granular protoplasm. They are arranged in groups or masses, each little mass being called a lobule, and each lobule slightly mapped off

by connective tissue and containing a meshwork of blood-vessels and ducts. These blood-vessels are branches of the *portal vein*. This vein receives the blood which has circulated in the stomach and intestines, and carries it throughout the entire liver by a network of finely subdivided veins. It is from this supply of blood that the bile is secreted.

The blood passes off from the liver by the *hepatic vein*, formed by the union of small vessels which begin in the centre of the lobules. The connective tissue of the liver is supplied with arterial blood by the *hepatic artery*. This blood, like that which has entered through the portal vein, is drained off into the hepatic vein.

There is, however, another set of vessels which ramify through the liver, namely the *bile ducts*, whose business it is to carry off the bile produced in the gland. These ducts intersect and unite until in the end two channels are formed, one from the right and the other from the left of the liver, which ultimately form one common exit into the small intestine called the *common bile duct*. Thus, when the bile has been secreted by the liver-cells, it is transferred by way of this hepatic duct into the small intestine, where it mingles with the food. When this flow of bile ceases, as it does when intestinal digestion is interrupted, the supply which still continues is stored in the gall-bladder, which forms a kind of reservoir situated under the liver.

The functions of the liver would seem to be at least threefold. It serves (1) to store up in the form of glycogen certain constituents of the food brought from the stomach and intestines by the portal vein, and to transform this glycogen into sugar (glucose), which is distributed to the body as it is needed; (2) to destroy the worn-out blood corpuscles, retaining the iron but eliminating the iron-free colouring-matter as part of the bile; and (3) to excrete the bile which is poured into the intestine. *See* BILE; GALL-BLADDER.

LIVER-FLUKE. *See* DISTOMUM.

LIVERPOOL, Robert Banks Jenkinson, second Earl of, born 1770, died 1828. He entered Parliament in 1790. As Foreign Secretary in the Addington ministry he negotiated the Treaty of Amiens, and he became Home Secretary in 1804. On the assassination of Perceval in 1812 he became Premier, and held that position till 1827. His opposition to all liberal measures, the severity with which he repressed internal disturbances, and his prosecution of Queen Caroline rendered him extremely u popular.

LIVERPOOL, city and seaport Lancashire, on the estuary of t Mersey, 291 miles from London, the L.M.S. Rly. An electric overhe railway serves the city and i suburbs. The area is 33 sq. mile Canals link the Mersey with t trading centres in the north and cent of England.

The buildings include the cathedr begun in 1904, which occupies a con manding site, and which, whe finished, will be one of the fine modern churches in the world. Th Roman Catholics have planned t build a cathedral which will rival S Peter's in size. The university, founde in 1903, has a school of tropical med cine and a technical college. In 193 a radium institute was opened.

The main industry of Liverpool i shipping, especially the import o cotton. Controlled by the Merse Docks and Harbour Board, there ar extensive docks on both sides of th river, the quays being 37 miles i length. Other industries are th manufacture of cement, chemicals &c. The city obtains its water supply from Lake Vyrnwy in North Wales. Pop. (1931), 855,539.—Cf. R. Muir, *A History of Liverpool*.

LIVERPOOL RANGE, a spur of the great coastal mountain system of Australia, separated from the Blue Mountains by the Goulburn River (Cassilis' Gap).

LIVERWORTS (so named from the appearance of the plants), a subdivision (Hepaticæ) of Bryophyta (q.v.), differing somewhat from mosses, to which, however, they are closely allied.

LIVERY COMPANIES, the civic companies or city corporations of London, survivals of the ancient 'guild' system (*see* GUILD). In London the influence of the 'craft guilds,' as opposed to that of the 'merchant guilds,' was predominant; they very early rose to great importance, and by the close of the fourteenth century had practically controlled the municipal government of the metropolis. Their members were called 'liverymen' because they were entitled to wear the uniform, or livery, of their respective companies.

In the early records of the Mercers' Company regulations are laid down for an annual dinner, contributions of members and apprentices, election of masters, settlement of disputes between members, and relief of impoverished members. Early in the fifteenth century this company provided standard brass measures, and generally regulated the trade. At the

present time there are seventy-six livery companies in London, including the twelve great companies of Clothworkers, Drapers, Fishmongers, Goldsmiths, Grocers, Haberdashers, Ironmongers, Mercers, Merchant Taylors, Salters, Skinners, and Vintners.

The government of London gradually passed from their exclusive control, and by the time of the Tudors they had lost the supervision of their own trades. They are now little more than charitable societies. The Merchant Taylors, Haberdashers, Grocers, and Mercers have identified themselves with large public schools. The Reform Bill of 1832 deprived the liverymen of their exclusive privilege of voting for members of Parliament for the City.

In 1884 a Royal Commission was appointed to inquire into the régime of the companies, and estimated their trust and corporate income at over £750,000, and the capital value of their property at £15,000,000.—Cf. Thornley and Hastings, *Guilds of the City of London and their Liverymen*.

LIVINGSTONE, David, missionary and African explorer, born at Blantyre, Lanarkshire, 1813, died at Ilala 1st May, 1873. His parents had settled in the neighbourhood of the cotton-mills near Blantyre, where David became a 'piecer' at the age of ten. While at work in the mill he learned Latin and read extensively, and having attended the medical and Greek classes at Glasgow University, he finally became a licentiate of the Faculty of Physicians and Surgeons of Glasgow.

Under the auspices of the London Missionary Society he proceeded in 1840 to South Africa, where he joined Robert Moffat in the missionary field. His first station was in the Bechuana territory, and here for nine years he was associated with Moffat, whose daughter he married.

Between 1853 and 1856 he made a great series of journeys. Starting from Linyanti, he ascended the Leeambye (Upper Zambesi), journeyed overland to Lake Dilolo, and thence to St. Paul de Loanda on the west coast. Returning to Linyanti, he struck eastwards from there in 1855, tracing the Zambesi to the Indian Ocean, and reaching Quilimane on the east coast in 1856, having thus crossed the entire continent.

After making various journeys and exploring the Lake Nyassa and Zambesi region, Livingstone set forth in 1865 to explore the doubtful sources of the Nile. From this time till his death he was engaged in laborious explorations in the lake region of South Africa, especially to the westward of Nyassa and Tanganyika, where he discovered Lakes Bangweolo, Moero, and the Upper Congo. For about three years he was lost to view, and doubts regarding his safety were only set at rest when it was known that H. M. Stanley, the special correspondent of the *New York Herald*, had found Livingstone at Ujiji, on Lake Tanganyika.

They parted in March, 1872, Livingstone marching to explore the southern end of Tanganyika, and Stanley proceeding to Zanzibar. After another year's wanderings he died at Chitambo's Village (Ilala). His body was buried in Westminster Abbey, having been conveyed to the coast by his faithful followers.—BIBLIOGRAPHY: T. B. Maclachlan, *David Livingstone* (Famous Scots Series); Sir H. H. Johnston, *Livingstone and the Exploration of Central Africa*; T. Hughes, *David Livingstone* (Men of Action Series).

LIVINGSTONIA, a mission of the Church of Scotland, established in 1875, at the south end of Lake Nyasa, South Africa; head-quarters now on west side of lake (Bandawé).

LIV'IUS ANDRONI'CUS, Roman poet, lived at Rome in the beginning of the third century B.C. He introduced tragedies after the Grecian model to the Roman stage, and, besides several epic poems, wrote a translation of the *Odyssey* in the old Saturnine verse. Only a few fragments of his writings are extant.

LIVORNO. *See* LEGHORN.

LIVY (Titus Livius), Roman historian, was born at Padua in 59 B.C., and died there in A.D. 17. Of the facts of his life not much is known. He appears to have belonged to a good family, and to have been comfortably off. He spent most of his life at Rome in the composition of his history. In politics he was a moderate Conservative; but his mild republicanism did not prevent him from enjoying the friendship of Augustus. He led a quiet life of study; in the preface to one of his later books he says that writing has become with him a fixed habit, which he could not shake off without discomfort. After the accession of Tiberius he returned to Padua, where he died three years later.

Livy wrote some minor works, which have not been preserved. His life's work, however, was his history of Rome, from its foundation to the death of Drusus (9 B.C.), or, to give it its proper title, *Ab urbe condita libri*. This immense work consisted originally of one hundred and forty-two books; of these only thirty-five are now extant (i–x and xxi–xlv), two of the extant books being incomplete (xli and xliii). It is a work of the greatest genius, and well merits the

foremost place among Roman histories which it has won.

In order to be able to appreciate the merits of the work, it is necessary to understand the intention of the author in writing it. Livy wrote his history as an imperishable monument to the greatness of Rome. It may be considered as a kind of sermon taking for its text the magnificent line of Ennius:

Moribus antiquis res stat Romana virisque.

He is the most human of historians. With elaborate investigations and detailed research he had nothing to do.

Llama (*Auchenia lama*)

He did not set out to write history in that way. He seems not only never to have undertaken any journeys for the purpose of research, but to have been unwilling to investigate sources of information which were conveniently at hand in Rome.

He lived a life somewhat apart from the world, and so is not always successful in dealing with military matters and with politics. He is at his best when dealing with men, especially with Romans of the old school, such as Quintus Fabius Maximus. He is somewhat inclined to glorify Rome at the expense of her enemies, but his portrait of Hannibal is wonderfully impartial.

His style, however, is what has made him outstandingly great. It can be argued that there is no greater prose style in the world than that of Livy. In this as in several other respects he resembles Gibbon.

R. L. Stevenson had to discontinue reading Livy as he found him exercising an undue influence upon his style. Pliny the Younger (*Epistles*, ii, 3) tells of a man who came all the way from Cadiz to Rome in order to see Livy, and when he had done so immediately returned, as though the city had no other sights worth seeing. Livy may be considered to have written the national Roman epic, and thus to have succeeded admirably in the task which he set himself.—BIBLIOGRAPHY: J. E. B. Mayor, *Bibliographical Clue to Latin Literature*; M. S. Dimsdale, *History of Latin Literature*; Sir J. E. Sandys, *A Companion to Latin Studies*.

LIZARD is the popular English name of numerous reptiles forming the ord. Lacertilia or Autosauri, and having usually two pairs of limbs, movable eyelids, and an elongated scaly body terminating in a tail. The lizards number more than 1,600 species, accommodating themselves to all conditions except cold, and increasing in size and number in tropical regions. In some the tongue is thick and fleshy and in others it is divided, while in most cases it is protrusible.

The chief families of lizards are the Scincidæ, or Skinks; the Geckotidæ, or Geckos; the Iguanidæ, or Iguanas; and the Chamæleonidæ, or Chameleons. Poison glands are wanting in the lizards; the only exception being the Heloderma of Arizona and Mexico, which has poison glands connected with grooved teeth.

LIZARD POINT, a headland of Cornwall, England, the southernmost point of Great Britain, with two lighthouses. Poldhu wireless station is in the vicinity. The village near, a popular pleasure resort, is called **Lizard Town.**

LJUBLJANA. *See* LAIBACH.

LLAMA (lä'ma or lyä'mä; *Lama lama*), an ungulate ruminating quadruped found in Latin America, closely allied to the camel, and included in the family Tylopoda. They differ from the camel in having no hump upon the back, in having a deeper cleft between the toes, in the callous pad of the foot being less developed, and in the interval between the canine and the back teeth being greater. The tail being short and the hair long and thick, the llama has the general appearance of a long-necked sheep, standing about 3 feet at the shoulder.

Of the four known species the guanaco (q.v.) and the vicuña (q.v.) are found in a wild condition, while the llama and the alpaca, varieties of the guanaco, have long been domesticated.

The llama is used by the inhabitants of Latin America to carry burdens after the manner of a camel. When loaded with about a hundredweight, it can travel some 14 miles a day across the mountain passes. They are gentle and docile creatures.

LLANBERIS (*hlan'be-ris*), a village of Caernarvonshire, North Wales, at the foot of the picturesque Pass of Llanberis, and between Llyns Padarn and Peris, a starting-point for the ascent of Snowdon (q.v.). Pop. 2,373.

LLANDAFF' (*Llan Tâf*, Church of the Tâf), formerly an ancient city of Taff Vale, Glamorganshire, South Wales, but now a suburb of Cardiff. It has been the seat of a bishopric since about the fifth century. The cathedral, which dates from the twelfth century, is largely rebuilt, and the ruins of a castellated gateway of the episcopal palace remain. Pop. 13,277.

LLANDEILO-, or LLANDILO-BEDS (lan-di'lo), in geology, the name of one of the Ordovician series, derived from the town of Llandeilo in South Wales.

LLANDOVERY, borough and market town of Caermarthenshire, on the Towy, 28 miles from Carmarthen, on the G. W. Railway. There are ruins of a castle. Pop. (1931) 1,980.

LLANDOVERY SERIES, the lowest division of the Gotlandian system, that is, of the system styled by Murchison Upper Silurian. It is named from a town in North-Eastern Caermarthenshire; but the series is probably best known in the classical Silurian area of the Welsh and English border. It is characterized by an abundance of the brachiopod Pentamerus.

Large areas of Gotlandian rocks in other parts of the British Isles have been classed as of Llandovery age on account of species of this genus and of their characteristic graptolites, Monograptus, appearing here for the first time. The Llandovery beds are often united with the overlying Tarannon shales (Birkhill shales of Southern Scotland) under the name Valentian.

LLANDRINDOD WELLS, an inland watering-place of Radnorshire, Wales. It has chalybeate, sulphur, and saline springs. Pop. (1931), 2,925.

LLANDUD'NO, a coast town and watering-place of Caernarvonshire, Wales, on a peninsula between Ormes Bay and the estuary of the Conway. It has a parade, promenade pier, and sea-bathing. The Happy Valley is an amusement centre. Steamers go to Liverpool and elsewhere. Pop. (1931), 13,677.

LLANELLY, a seaport and municipal borough of Caermarthenshire, South Wales, on Burry Inlet, Caermarthen Bay. It gives name to one of the parliamentary divisions of the county. There is a floating and other docks, and Llanelly is the outlet for South Welsh coal. Tin-plates are manufactured. Pop. (1931), 38,393.

LLANFAIRFECHAN, urban district of Caernarvonshire. About 8 miles from Bangor, it is a popular watering-place. Pop. (1931), 3,162.

LLANGAMMARCH WELLS, watering-place of Brecknockshire, 15 miles from Llandovery, on the L.M.S. Rly. The waters here are suitable for heart troubles as they contain barium chloride, which is not found anywhere else in the British Isles. Pop. (1931), 700.

LLANGEFNI, market town and urban district of Anglesey, on the River Cefni, 246¼ miles from London, on the L.M.S. Rly. It is an agricultural centre. Pop. (1931), 1,782.

LLANGOLLEN (*hlân-goth'len*), an urban district and town of Denbighshire, North Wales, on the Dee. Near Llangollen are Valle Crucis Abbey, the ruins of an ancient Cistercian foundation, and Plas Newydd, the residence of the 'Ladies of Llangollen.' The town bridge (1345) is one of the wonders of North Wales. Pop. (1931), 2,937.

LLANIDLOES, borough and market town of Montgomeryshire. It is 14¼ miles north of Rhayader, and 190¼ from London by the G.W. Rly., and is situated on the Severn. It has lead mines and flannel mills. Pop. (1931), 2,356.

LLANOS, the South American nomenclature for the pampas, prairies, or savannahs of the Orinoco Basin. During the dry winter their vegetation is burned up by the sun, and in the rainy season they are flooded with water. Between these two seasons the llanos produce rich guinea-grass and chaparral bushes, and are ranged by vast herds of cattle and horses. The Llano Estacado (Sp., Staked Plain) is an extensive plateau divided between New Mexico and Texas. It is comparatively barren.

LLANQUIHUÉ, a southern province of Chile. It contains extensive natural forests covering some 1,406,024 acres, and is mountainous and well-watered. **Llanquihué Lake** is the largest lake in Chile; area, 225 sq. miles. The provincial occupations are mainly agricultural. Puerto Montt, a seaport, is the capital, with a wireless station, harbour accommodation, and exports of timber and wheat; pop. about 5,000. Provincial area, 34,778 sq. miles; pop. 137,206.

LLANRWST, urban district and market town of Denbighshire. It is 12 miles from Conway and 218¼ from London, on the L.M.S. Rly. Malting and tanning are its principal industries. Pop. (1931), 2,366.

LLANTARNAM, urban district of Monmouthshire, 5 miles from Pontypool and 3 from Newport, on the G.W. Rly. Its buildings include Llantarnam Abbey and coal mining is its chief industry. Pop. (1931), 7,284.

LLANTHONY, village of Monmouthshire, 9 miles from Abergavenny, on the Honddu River. Its ruined abbey was a house of the Austin Friars, founded in 1108 and from 1811 to 1814 was the home of Walter S. Landor. Near is a modern abbey founded in 1869 by the Anglican monk, Father Ignatius. It belongs to the English Benedictines.

LLANTRISANT, market town of Glamorganshire, 10½ miles from Cardiff, on the G.W. Rly. There are numerous collieries in the vicinity. Pop. 21,946.

LLANTWIT MAJOR, market town of Glamorganshire. It is 3½ miles from Cowbridge on the G.W. Rly. Llantwit had a monastery, which was a famous seat of learning in the Middle Ages, and a seaport, Colhugh, on the Bristol Channel.

LLANWRTYD WELLS, urban district and spa of Brecknockshire. An inland watering-place, it is 11 miles from Llandovery and 185 from London, on the L.M.S. Rly. Pop. (1931) 742.

LLEWELLYN, Sir William, English artist. Born in Dec., 1863, he studied art in S. Kensington and in Paris. In 1912 he was elected A.R.A. and in 1920 R.A. He was chosen President of the Royal Academy in 1928. In 1931 he received the Grand Cross of the Victorian Order. He has painted portraits of Queen Mary and other members of the royal family.

LLOYD GEORGE, David, British politician, born 17th Jan., 1863, at Manchester, of Welsh parents. His father, William George, a poor schoolmaster, having died at the age of forty-four, the boy was brought up by his maternal uncle, a Baptist cobbler, in the village of Llanystumdwy, North Wales. Educated at the village National School he afterwards studied for the law and became a solicitor.

Vehemently opposed to the dominance of the Church of England, the young solicitor soon became well known as a fighter for and champion of Welsh nonconformity and Welsh nationalism. His reputation increased, and at the age of twenty-five he became almost famous as the winner of a lawsuit concerning the right of burial of Nonconformists in parochial burying-grounds. In 1890, at a by-election, he was returned to Parliament as Radical member for the Carnarvon Boroughs, and has kept his seat ever since.

He fought his way single-handed, and soon became conspicuous for his spirit of independence, his caustic wit, and his pungent utterances. During the South African War the fiery Welshman unhesitatingly espoused the Boer cause, even at the imminent danger of his life. Mobbed at Birmingham in 1900, he was at that time the most unpopular and best-hated man in Great Britain.

When the Liberals came into power in 1905, Lloyd George was included in the Cabinet, formed by Sir Henry Campbell-Bannerman, as President of the Board of Trade, and was admitted to the Privy Council. During his tenure of office he passed the Patents and Designs Act, compelling manufacturers holding British patents to make their goods in Britain instead of abroad. He also passed the Merchant Shipping Act.

In 1908 Mr. Asquith became Premier, and Lloyd George, whose reputation was now firmly established, was appointed Chancellor of the Exchequer. As such he was responsible for the Old Age Pension Bill, and on 29th April, 1909, he presented to Parliament his famous Budget.

By the introduction of its drastic reforms, especially land taxation, this Budget became the target of fierce attack and led to serious conflict with the House of Lords. A deficit of about £16,000,000 was to be expected, and had to be provided for without diminishing the cost of naval preparations, and increased taxation was the only remedy.

The Chancellor of the Exchequer decided to 'rob hen-roosts.' His proposals were heavier taxes on spirits and tobacco, and a new tax on petrol for motor-cars, increases in the income tax, but above all a novel land tax and system of duties on land values. Financial London was aghast, and the Budget was rejected by the House of Lords; Parliament was prorogued, and a new election took place. The Budget was eventually passed. Returned to office, Lloyd George defended the Parliament Bill, which as an act abolished the veto or legislation hitherto exercised by the House of Lords.

In 1911 he presented another of his great reforms, the National Health Insurance Act against sickness, and contriving also provisions for insurance against unemployment. He announced his intention to introduce sweeping reforms in the English land laws, to break up the great estates, and to restore the land to the people.

As Chancellor of the Exchequer in 1914 he arranged for huge war loans,

unprecedented in the history of the country. In the Coalition Cabinet of Mr. Asquith, formed in May, 1915, he was given the new portfolio of Minister of Munitions, and in June, 1916, he succeeded Lord Kitchener at the War Office.

When Mr. Asquith resigned, and Mr. Bonar Law had refused to form a ministry, Mr. Lloyd George in 1916 became Prime Minister, and for three years almost the dictator of the country. When the war was brought to a successful issue, he was one of the most influential delegates at the Peace Conference. Shortly after the signing of the peace treaty he was awarded the Order of Merit. In the Genoa Conference of 1920 he was a prominent figure. With Mr. Bonar Law in 1918 he conducted the General Election which marked the break-up of the Liberal Party.

The outstanding political event of 1921 was the negotiation of the Irish settlement by Mr. Lloyd George. In October, 1922, his resignation of the premiership immediately followed the Conservative party's 'Carlton Club' decision to withdraw their support from the Coalition. In the elections of 1923 and 1924 the Liberals, divided and confused under the rival leadership of Mr. Asquith and Mr. Lloyd George, lost their ascendancy in Parliament and the Labour Party became the Opposition. In 1924 he published *Coal and Power*. His land reform schemes of 1925 did little to help the enfeebled condition of his party.

In 1925 he succeeded Mr. Asquith (then made Lord Oxford) as leader of the Liberal party in the House of Commons. His attitude at the time of the general strike caused a breach between him and certain Liberals, including Lord Oxford. In the election of 1929 he issued an elaborate scheme for the cure of unemployment. In spite of its vigorous advocacy and strong appeal only fifty-eight seats were held by the Liberal party. In the General Election of 1931 Mr. Lloyd George parted company with Sir Herbert Samuel and Sir John Simon who led the main body of Liberals in support of the National Government and Mr. Lloyd George's section of the party was reduced to six in the new Parliament. In these latest years, although a prominent figure in House of Commons debates he has devoted himself mainly to experimental farming at Churt, in Surrey.

LLOYD, Edward, English publisher. Born 16th Feb., 1815. In 1842 founded *Lloyd's News*, a London Sunday paper, which was a great success. He also started the *Daily Chronicle*, and established paper mills at Sittingbourne as Edward Lloyd, Ltd. He died 8th April, 1890.

LLOYD, W. Edward, English singer. Born in London, 7th March, 1845, he sang as a boy in the choir of Westminster Abbey, and later in the Chapel Royal. About 1871 he went on the concert platform, and his fine tenor voice made him one of the most popular vocalists in the land. He died 31st March, 1927.

LLOYD, Harold, American comedian. He was born at Burchard, Nebraska, on 20th April, 1894. Beginning as an extra with the Edison Company in 1913 he joined Hal Roach a year later, making a reputation with "A Sailor Made Man," "Granny's Boy," &c. In 1923 he organized the Harold Lloyd Corporation whose first picture was "Girl Shy."

LLOYD, Marie, English music hall artist. Born 12th Feb., 1870, she first gained recognition in the East end, but later appeared at the Oxford music hall, and in pantomime at Drury Lane. She was the embodiment of cockney humour, exploiting the cockney genius for low comedy in turns which placed her among the foremost music hall artists. She died 7th Oct., 1922.

LLOYD'S REGISTER. *See* INSURANCE.

LLULLAILLACO, a South American peak of the Andes, volcanic, and on the borders of Chile and the Argentine, around the line of 25° lat. height, about 20,500 feet.

LOACH, a small fish (*Nemachilus barbatulus*) inhabiting small clear streams in England and Southern Scotland, and esteemed dainty food. A smaller species, the spined loach or groundling (*Cobitis tænia*), also occurs in England.—The name is also given to the eel-pout or burbot (*Lota lota*) and the three-bearded rockling (*Motella vulgaris*), a shore species.

LOAD LINE, Plimsoll mark placed amidships on the sides of a vessel to show the limit to which loading may be carried. This mark consists of a twelve-inch circle with a horizontal line drawn through the centre, and in addition a " grid " is marked to show load lines for different seasons and waters.

LOADSTONE, or magnetite (q.v.), magnetic oxide of iron (Fe_3O_4). The ancients were acquainted with the singular property which it has of attracting iron, and magnets received their name from the fact that they could be made by bringing iron rods into contact with magnetite. The mineral became known as the loadstone (lodestone) or 'leading stone.'

LOAM, a soil compounded of various materials, but typically a sandy clay, neither too heavy nor too light for tillage-farming. Humus is found in loams in considerable quantities, and the soil is fertile in proportion.

LOAN, anything lent or given to another on condition of return or payment. In law loans are considered to be of two kinds—*mutuum* and *commodate*; the former term being applied to the loan of such articles as are consumed in the use; the latter to the loan of such articles as must be individually returned to the lender.

The acknowledgment of a loan of money may be made by giving a bond, a promissory note or an IOU. In England the contract of loan may be proved by the lender's oath, supported circumstantial evidence, or letters of the borrower.

LOAN SOCIETIES, institutions established to lend money to the working-classes, receiving repayment by instalments, with interest. They are governed by the Loan Society Act, 1840, inapplicable to Scotland, and exempt from the provisions of the Money Lenders Act, 1900. The maximum loan is £15, and another loan cannot be made until the first has been repaid. £12 per cent per annum is the maximum chargeable rate of interest. The property of societies is vested in trustees, and they are under the inspection of the Crown.

LOANDA, SÃO PAULO DE, capital and seaport of Angola (Portuguese West Africa), and the seat of the High Commissioner. Loanda is built upon a bay formed by a sand-spit thrown up by the Benguela current, and is near the Coanza, the source of its water-supply. Livingstone walked to Loanda in 1854 to open up a trade route from the Zambezi. The town has railway (metre gauge) connections with Malanje. The exports are mainly rubber and coffee, and the imports textiles. Pop. 23,000.—BIBLIOGRAPHY: E. H. L. Schwarz, *South African Geography*; H. Masquardsen, *Angola*.

LOANGO, a West African coastal belt, divided among Portugal (Kabinda, Angola), France (Kwilu, Gabun Colony), and the Congo Free State at the Berlin Conference, 1885.

LOANGO, capital and port of Kwilu, Gabun Colony, French Equatorial Africa. There is no harbour, steamers lying-to 3 miles outside the bar. The exports are mainly wild caoutchouc and palm-oil. Whale fishing commenced in 1922.—Cf. G. Bruel, *L'Afrique équatoriale française*.

LOASACEÆ, a small family of polypetalous dicotyledons, natives of the Andes, mostly twining herbs with stinging hairs; allied to Passifloraceæ. *Mentzelia* (*Bartonia*) *aurea* and others are grown for their handsome or curious flowers.

LOBE'LIA (named after Matthew Lobel, physician to James I of England), a very extensive genus of beautiful herbs, natives of almost all parts of the world, especially of the warmer parts of America, tribe Lobeliaceæ, nat. ord. Campanulaceæ. *L. inflāta* is the Indian tobacco, which is cultivated in North America, and is employed in medicine. The small blue lobelia so popular in gardens is *L. Erinus*, a Cape species. A brilliantly scarlet-flowered species, *L. cardinālis*, is the cardinal-flower. *L. siphilitica*, an American species, possesses emetic, cathartic, and diuretic properties. Two species are found wild in Britain.

LOBELIA'CEÆ, a tribe of Campanulaceæ, differing from Campanulaceæ proper in having irregular flowers, and like the Compositæ syngenesious anthers, but otherwise resembling them very nearly.

LOBITO BAY, a harbour in Portuguese West Africa. It is 4,930 miles from Southampton. The best harbour on the W. Coast, it is protected by a spit of sand and large vessels can anchor close to the shore. The bay is famed for its oysters.

LOBOS, or **SEAL ISLANDS,** three Pacific islands in the Peruvian littoral, opposite Lambayeque, called Lobos-de-Tierra, Lobos-de-Afuera, and Punta Lobos respectively.

LOBSTER, the common name of the macrurous (long-tailed), decapodous (ten-footed), stalk-eyed crustaceans, belonging to the genus Homārus. The first pair of ambulatory limbs bears the well-known and formidable lobster-claws. The abdomen possesses small forked limbs (swimmerets), to which the eggs are attached. The tail consists of several flat shelly plates capable of being spread like a fan, and used as a swimming organ. They inhabit the clearest water, living in the crevices of a rocky bottom.

The common lobster (*H. vulgāris*) is found in great abundance on many of the European shores. Very rich and nourishing dishes are made from the flesh of the lobster. They are generally in the best condition from the middle of October till the beginning of May. *H. americanus*, closely allied to the British lobster, is found on the coasts of North America. The so-called freshwater lobster is the crawfish or crayfish.

LOBWORM (*Arenicŏla piscatōrum*), a genus of Chætopoda or Bristle-worms. It has a round, obtuse head, a body about the size of a large earth-worm, and respires through thirteen pairs of gill-tufts. Traces of the lob-worm may be found on every sea-beach in the little coils of sand which it leaves when burrowing after the tide has ebbed. It is used for bait in deep-sea fishing. It is called also **Lug-worm.**

LOCAL GOVERNMENT is the term used to denote the government or management of the various sub-divisions of a country, as distinguished from the supreme government. English local Government is the product of many hundreds of years of historical development; existing local govern-ment areas are in many cases identical with areas marked out a thousand years ago. Its function is chiefly ad-ministrative and judicial; and it may be carried out by parishes, municipal boroughs, &c. In England and Wales a uniform system of local government was introduced by the Local Govern-ment (England and Wales) Act, 1888, based on the parish as the smallest unit of local government, the rural district, the urban district, and the county, with direct representation of the inhabitants, a principle already recognized in regard to urban com-munities.

In Scotland the Local Government (Scotland) Act, 1889, took effect from May, 1890. The administrative county, as defined therein, was divided into electoral divisions, each return-ing one member to the county council. The electors of these county coun-cillors were those persons, male or female, over twenty-one years of age who possessed the qualification as occupier under the Representation of the People (Equal Franchise) Act, 1928. The county councillors thus elected formed three-fourths of the council, and the other fourth, called county aldermen, were selected by the council. The chairman was appointed by the council from among their number, and the councillors, after serving three years, retired together.

By Acts of 1894, for England and Scotland respectively, parish councils were created (*see* PARISH); and by the Education Act of 1902 councils, county boroughs, and similar authori-ties in England and Wales (to London in 1903). By an Act of 1898 county councils were set up in Ireland.

In 1919 the Ministry of Health for England and the Scottish Board of Health were established, and the powers and duties which previously had belonged to the Local Government Boards of the two countries were transferred to the new authorities respectively.

The Local Government (Scotland), Act, 1929, provided for one local authority—County Council, Town Council, or District Council—in each area, for the administration of local services. To the reconstituted county councils were transferred the powers and duties of district committees, education authorities (except those of Glasgow, Dundee, Edinburgh, and Aberdeen, which have been trans-ferred to the town councils), parish councils (except in large burghs and certain landward areas), District Boards of Control in landward areas and small burghs, Commissioners of Supply, and Standing Joint Committees. The powers of the parish council in large burghs (population of over 20,000) were assumed by the Town Councils.

Lobworm

Included in the duties of the County Councils are those of poor law, registration, health services, education, police, roads, water supply, drainage, lighting, licensing of places of amusement, and provision of mental asylums. Similar powers were given to the Town Councils of large burghs and in a less degree to those of small burghs. Wide powers were given to the reconstituted County Councils for delegation of their functions to District Councils and to sub-committees.

By the Representation of the People Act, 1918, which extended the parliamentary franchise to women of thirty with special qualifications, local government franchise was thrown open to women under similar conditions. The later Representation of the People (Equal Franchise) Act, 1928, made the qualifications for local government franchise the same for men as for women.

For registration as a local govern-ment elector a person—male or female—must be (*a*) twenty-one years of age and (*b*) not subject to any legal

incapacity, and (1) in occupation either as owner or tenant of land in the electoral area, provided that the ownership or tenancy has held good during the qualifying period up to and including the last day therein, or (2) is the husband or wife of one who is so entitled. In addition there is a *service* qualification by which a man or woman of twenty-one years of age and not subject to any legal incapacity is eligible for local government franchise. Where a person in virtue of his employment, service, or office occupies a house not inhabited by his employer he is counted as being entitled to a tenant's vote.

Local Government finance is based on rates, based upon property owners within the area, supplemented by Grants-in-aid from the central Government and revenues from municipal enterprises and trading services. By the Rating and Valuation Act of 1925 the rating law was finally consolidated and the position of the rest of England put on a similar basis to that of London. By this Act the country was divided into urban and rural rating areas. (*See* RATING, LAW OF.) For information dealing with the question of derating and the proposals included in the recent measures of local government reform *see* the same article.

The first thirty years of the twentieth century saw many additional responsibilities put upon local authorities. Few definite reforms were carried through in that time, but much legislation was passed developing the scope of these authorities and in every way adding to their powers. Acts dealing with tuberculosis, venereal diseases, maternity and child welfare, mental deficiency had been passed, and many schemes for housing and developments in education had been introduced. It became obvious that the old machinery for dealing with this changing state of things was unsatisfactory, and various commissions were appointed to investigate the weak points in the existing scheme. The need for reform was increasingly great, and by 1929 legislation dealing with most branches had been introduced. *See* POOR LAW; RATING, LAW OF; HEALTH, MINISTRY OF.

LOCAL OPTION, a term applied in matters of temperance legislation, to the principle by which a certain majority of the inhabitants or ratepayers of a certain locality may decide as to whether any, or how many, shops for the sale of intoxicating liquors shall exist in the locality. The principle was put into operation in Scotland in 1920 under the provisions of the Temperance (Scotland) Act, 1913. A poll was held in every area in which a requisition was signed by not less than one-tenth of the electors, the questions submitted being (*a*) no change, (*b*) limitation, and (*c*) no licence. In 87 per cent of the areas the electors voted against any change, and only about 7 per cent carried the no-licence resolution, the remaining areas favouring a reduction in the number of licences. Local option is also in operation in connection with the opening of cinemas on Sunday. Under the Sunday Entertainments Act, 1932, the Home Secretary may authorise local authorities to grant licences for the opening of cinemas on Sundays, subject to a poll of the local government, elections being taken and a majority of the voters declaring in favour of Sunday opening. Between 30 and 40 local plebiscites have been taken under this Act up to date (July 1933) in favour of Sunday opening.

LOCARNO, a Swiss town on Lago Maggiore, taken from Milan in 1803, and Italian in everything but position. Pop. 7,500.—From Oct. 5th to 16th, 1925, an international conference was held at Locarno, being attended by representatives of Britain, Belgium, France, Italy, Czechoslovakia, Poland, and Germany. The **Locarno Conference** marked an important stage in the development of post-war international relations, in the discussion of the means of preventing future wars, and of securing the peaceful settlement of international disputes.

The most significant result of the Conference was the entry of Germany into the League of Nations, and the allocation to her of a permanent seat on the League Council. In addition the following seven treaties were initialled:—1, The Rhineland Security Pact between Britain, France, Belgium, Italy, and Germany; 2 and 3, arbitration treaties between Germany and Belgium, and Germany and France (both signed by the same powers as 1); 4 and 5, arbitration treaties between Germany and Poland, and Germany and Czechoslovakia; 6 and 7, treaties of security between France and Poland, and France and Czechoslovakia providing for mutual aid in the event of Germany making an unprovoked resort to arms, or of any unprovoked attack being made on either country.

The Pact embodies the guarantee of the inviolability of the frontiers between Germany and Belgium and Germany and France, and the undertaking by these three powers not to make war on one another. Questions of dispute are to be referred to Conciliation Commissions, or to the Council of the League of Nations.

There are reservations as to self-defence in the event of unprovoked attack, and in the event of German violation of the Versailles Treaty with regard to the demilitarized Rhine Zone. Britain as a contracting party is pledged to the active support of Belgium, France, or Germany, should one of these powers be attacked without provocation by another. An allegation of such an attack is to be reported to the Council of the League of Nations, and should the Council hold that the attack has been made, the guarantee is to come into immediate operation. The superiority of the League of Nations is thus fully recognized. The other arbitration and security treaties are reciprocal. The final protocol initialled at Locarno contained an undertaking by all the contracting parties to co-operate in the work of disarmament already begun by the League of Nations.

The treaties were signed in London on Dec. 1st, 1925. As a direct result the British evacuated the Cologne Zone in Dec., 1925, and Jan., 1926, and in Feb., 1926, Germany applied for admission to the League of Nations. In accordance with the League of Nations constitution, Germany by her admission would automatically have become a permanent member of the League Council. (*See* LEAGUE OF NATIONS.) Unfortunately several smaller powers objected to this, and eventually when the League met in March, Brazil vetoed the admission of Germany. In September, however, Germany was admitted to both League and Council, and ratifications of the Pact (which at once came into force) were exchanged. *See* PROTOCOL.

LOCHABER, a mountainous district of Inverness-shire, Scotland, containing Lochs Linnhe, Leven, and Eil. The gigantic Lochaber Hydro-electric Scheme involved the driving of a tunnel through Ben Nevis.

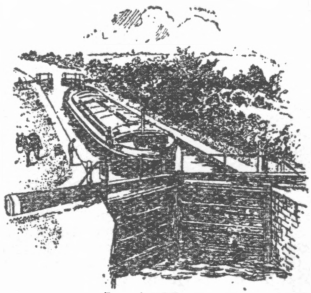
LOCHES, a town of France, department of Indre-et-Loire. It was a residence of French kings. Pop. 5,210.

LOCHGELLY, a mining burgh of Fifeshire, Scotland, near Dumfermline. Pop. (1931), 9,297.

LOCHMABEN (lo*h*-mā'ben), a royal burgh of Scotland, Dumfriesshire, 8 miles north-east of Dumfries, surrounded by seven lochs. Near the town, which is situated on the Annan, are the ruins of a castle of Robert the Bruce. &op. (1931), 1,014.

LOCHY, a loch of Inverness-shire, Scotland, on the Caledonian Canal route.

LOCK, a junction between two water-levels in a canal, used in raising and lowering boats from one level to the other. Substantial gates, usually of oak, are provided at each end, as well as sluices cut through from the lock sides to the canal. When a vessel is descending, water is passed into the lock through the sluices until it is on a level with the higher end; the gate at that end is then opened and the boat allowed to enter. When the gate is closed, the level of the water in the lock is lowered by opening the outlet sluices until the canal lower level is reached. The low-level gate is then opened, and the vessel can continue its journey. In ascending the operation is reversed. Where the difference of level is considerable, *inclines* or *lifts* may be employed.



Lock in a Canal

LOCK, a key-controlled fastening for doors, drawers, or box lids. The simple bolt, held either open or shut by a spring, was in use until the end of the eighteenth century. Barrow introduced the lever lock (1778), in which the lift had to be exactly right to allow the bolt to pass. In the Chubb lock (1818) there are several pivoted levers or tumblers, which are lifted by the key to such positions that slots in them come into line and permit the passage of the bolt-pin, so that the bolt can be sent home by a spring. A detector or lever holds the bolt firmly in place if any tumbler is raised too high, by a lock-picker for instance.

The Yale lock also uses spring-held pins, but in place of a single pin there are two in each hole. When the key with its irregular edge is introduced to its full extent, the divisions in the pins come into line with the edge of the barrel, and the barrel, which carries its motion to the bolt, can be turned.

Combination locks have a number of discs, with a single notch in each, mounted on a common spindle. Each disc is turned by a pin on its neigh-

bour. If the discs are moved round by means of the dial, so that all the notches are in line, the door can be opened. The dial is lettered or figured, and the order or combination can be changed at any time.

LOCKE, John, English philosopher, born 1632, died 1704. A graduate of Christ Church, Oxford, he applied himself to the study of medicine. In 1666 Locke made the acquaintance of Lord Ashley, afterwards Earl of Shaftesbury, holding various offices under the patronage of that nobleman. In 1682 his patron retired from politics to Holland, Locke accompanying him in his exile. Owing to the internal troubles of his country, and the triumph of the opposition, Locke continued to reside abroad. He returned to England at the Revolution, and was appointed Commissioner of Appeals under the new Government.

So early as 1670 Locke had formed the plan of his famous *Essay on the Human Understanding*, a plan which he had carefully elaborated in his exile, and which he published in its completed form in 1690. It was received with much opposition, notably by the University of Oxford, which resolved to discourage it; but despite this it acquired a great reputation throughout Europe, and was translated into French and Latin. Locke was made a Commissioner of Trade and Plantations in 1695, but retired when unable to perform his duties, and lived with his friend Sir F. Masham until his death.

The chief purpose of Locke's celebrated *Essay* was to find the original sources and the scope of human knowledge. Among other works of Locke are his *Letters on Toleration*; *Thoughts concerning Education*; *Notes upon St. Paul's Epistles to the Galatians, Corinthians, Romans, and Ephesians*; and a *Treatise on the Conduct of the Understanding*.—BIBLIOGRAPHY: H. R. Fox-Bourne, *The Life of John Locke*; T. H. Fowler, *John Locke*; A. C. Fraser, *Locke*; G. E. Russell, *The Philosophy of Locke*; Sir L. Stephen, *History of English Thought in the 18th Century*.

LOCKE, William John, English novelist. Born in Barbados, 20th March, 1863, he was educated at S. John's College, Cambridge. He became an architect, but later turned to literature, and in 1905 scored a success with *The Morals of Marcus Ordeyne*, followed by *The Beloved Vagabond*. His works include *The Joyous Adventures of Aristide Pujol*, *Stella Maris*, *Septimus* and *The Great Pandolfo*. In 1930 he issued a volume of short stories, *The Town of Tombarel*, and after his death appeared *The Shorn Lamb*. He wrote a pla *The Man from the Sea*, and adapte some of his novels for the stag Locke died in Paris, 16th May, 193

LOCKER-LAMPSON, Frederick English man of letters, born 182 died 1895. In 1857 was published h volume of occasional verse entitle *London Lyrics*, which passed throug various editions and became ver popular. In 1867 appeared his *Lyr Elegantiarum*, an anthology of 'som of the best specimens of *vers d société* and *vers d'occasion* in th English language'; a subsequent pro duction of his was entitled *Patch work* (1879).

LOCKHART, John Gibson, bio grapher of Sir Walter Scott, born 1794, and died at Abbotsford 1854. He studied at Glasgow and Balliol College, Oxford, and was called to the Scottish Bar in 1816. In 1817 he became a contributor to *Blackwood's Magazine*, then a new venture, and married Sir Walter Scott's daughter in 1820. From 1826, for twenty-seven years, he edited the *Quarterly Review*, and published many miscellaneous works; but the crowning effort of his career was reached with the publication (1838) of the last volume of his *Life of Scott*.—Cf. A. Lang, *Life and Letters of Lockhart*.

LOCKJAW, infectious disease, also called tetanus (q.v.).

LOCKPORT, a city of New York, United States, capital of Niagara county. The canal locks, formerly five, now two, are operated by electricity. It was founded in 1825, incorporated as a city in 1865, and has a large fruit trade. Pop. (1930), 23,160.

LOCKWOOD, William Henry. English cricketer. Born in Nottingham, 25th March, 1868, he became known as a cricketer, playing for his own county and later for Surrey. He soon made a reputation, both as a bowler and a batsman, and played for England against Australia in 1893, and again in 1899 and 1902. For some years he was the finest bowler in England, and one of the great all-round players of the game. He retired in 1904, and died 27th April, 1932.

LOCKYER, Sir Joseph Norman, astronomer, born 1836, died 1920. He was a clerk at the War Office (1857), and went to the Science and Art Department, South Kensington. In 1913 he became director of the Hill Observatory at Salcombe Regis (Sidmouth). He was director of several Government eclipse expeditions, president of the British Association (1903–4), and author of several books. He was a pioneer in

the application of spectroscopy to the sun, established the existence of the chromosphere, and was the first to recognize helium. In 1869 he founded the scientific journal *Nature*.

LOCLE (lok'l), **LE,** a town of Switzerland, in the canton of Neuchâtel, an important watch-making centre, the industry dating from its inauguration by D. J. Richard (1665–1741) in 1681. Pop. (1930), 12,001.

LOCOMOTIVE. While the continent of Europe was in the throes of the Napoleonic wars, a band of Englishmen, Trevithick, Blenkinsop, Blackett, Hedley, Dodds, and Stephenson, were working on locomotive designs and experiments, the pioneer work on which our modern railway traction is based.

The Stockton and Darlington Railway was opened in 1825, when Stephenson drove a locomotive with thirty-four wagons. No great sensation was caused in those early days by the coming of the railway engine until the opening of the Liverpool and Manchester line in 1830. The success of the *Rocket*, for which George and Robert Stephenson received the prize of £500 offered by the directors of that line, convinced the public of the soundness of the development, and led to the flotation of a great number of railway schemes in different parts of the country.

The size of the locomotives grew as their use became commoner, and types suitable for particular classes of service and gradients were gradually evolved. In practically every component of the locomotive there are features which are different from the constructions having the same functions in stationary steam plants. The fire-box of a locomotive boiler differs from all other types in its form, which is almost cubical and open at the foot. The width of the lower part of the fire-box is of course limited by the space between the frames, but in the upper part limitations are not so exacting, and the width is made greater. The outer shell of the boiler at this end follows the lines of the fire-box, with a water space of about 4 inches between them. The boiler barrel is riveted to this outer shell and to the front tube-plate. The tubes are fixed in the tube-plate and fire-box, and the whole structure is amply braced by tie-rods. The fire-bars rest on supports in the sides of the fire-box. The draught necessary for the combustion of the fuel is caused by the passage of the exhaust steam from a blast-pipe under the chimney. The valves which admit steam to and exhaust it from the cylinders are usually of the slide-valve type, sometimes balanced. The valves are operated by link motion or valve gear, generally Stephenson or Walschaert. Allan's link motion and Joy valve gear are also used to a limited extent.

Superheating is common on express-type locomotives, in which some of the boiler-tubes are replaced by a smaller number of a much larger size, through which the superheater tubes pass from and to headers in the smoke-box. The Robinson, Schmidt, and Swindon are the most commonly used superheaters. The use of compound expansion of steam in locomotive engines is increasing, but its total use as yet is small.

Oil-firing is not regularly used in Great Britain, but the fire-box fittings in use on some railways have been designed to suit an immediate change to that system to meet a coal-strike, or coal shortages through other causes. The boiler is covered with lagging material, such as asbestos mats and prepared felt under the steel or iron sheet covering.

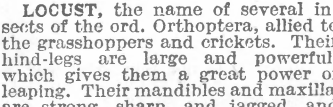
Tank locomotives have the water-tank, and carry the fuel, on the same frame as the engine and boiler. The other types have a separate wagon, called a *tender*, for the water-tank and fuel. All locomotives are classified by the number of wheels in each of the three groups: those supporting the front end, the coupled driving-wheels, and the group supporting the back of the frame. Tank locomotives have been employed to a greater extent in Great Britain than in any other country. They are used for short-distance passenger trains, and also where the railway passes through large industrial districts.

The present-day express passenger engine is one of four cylinders, with single expansion, using superheated steam, and having six-coupled driving-wheels, with a four-wheeled leading bogie. This class, 4-6-0, is also used for fast goods service. It is characterized by ample boiler capacity for gradients, and although the weight is considerable the axle loads are moderate. The 4-4-2, or Atlantic type, is used to a limited extent in Great Britain for heavy high-speed service. For goods traffic in non-mining areas a six-coupled locomotive finds favour, but where there is heavy mineral traffic, engines of 0-8-0, 2-8-0, or 0-10-0 classes are preferred.—BIBLIOGRAPHY: *Railway Mechanical Engineering* (The Gresham Publishing Company); W. F. Pettigrew, *A Manual of Locomotive Engineering*; C. S. Lake, *The World's Locomotives*; C. E. Wolff, *Modern Locomotive Practice*.

LOCOMOTOR ATAXY, also known as **tabes,** is a peculiar disease of the

nervous system, deriving its name from the fact that the sufferer from it cannot order the movements of his limbs for definite purposes. The patient requires to guide his feet and legs by means of his sight, and even then the feet are jerked out and brought down in a violent way. This difficulty of movement is called 'want of co-ordination of movement.' The disease is one of the late manifestations of syphilis. Its progress usually extends over a number of years, and there is no recovery.

LOCUST, the name of several insects of the ord. Orthoptera, allied to the grasshoppers and crickets. Their hind-legs are large and powerful, which gives them a great power of leaping. Their mandibles and maxillæ are strong, sharp, and jagged, and their food consists of the leaves and green stalks of plants. They fly well, but are often conveyed by winds where their own powers of flight could not have carried them.



Locust (*Pachytylus migratorius*)

Species. The most abundant species, *Pachytylus cinerascens*, ranges across the Old World from the Atlantic to the Pacific. A large species (*Schistocerca peregrina*) common in Northern Africa and North-West India is probably the Egyptian plague mentioned in *Exodus*. Locusts frequently swarm in countless numbers, darkening the air in their excursions, and devouring every blade of the vegetation of the land they light on. They are destructive both in the larval, nymph, and perfect conditions. The Arabs and others use them as food. When dried in the sun, they are pounded up and baked into bread, or fried in oil as a delicacy.

In America locusts are usually known as 'grasshoppers.' There are two specially destructive species, one of which, *Caloptēnus femurrubrum*, is found in Northern New England and Canada; and the other, *Caloptēnus spretus*, breeds abundantly west of the Mississippi.

LOCUST TREE, or ACACIA (*Robinia pseudacacia*, nat. ord. Leguminosæ), is found in the Eastern States of North America, but grows to its best in Kentucky and Tennessee. There it acquires a girth of 12 feet and a height of 80 feet. The leaves are pinnate, smooth, and prickly at the base: the flowers grow in pendulous racemes, white, fragrant, and producing smooth pods.

LODÈVE (lo-dāv), a town of France, department of Hérault. It is the ancient *Luteva*, and under the Romans was known as *Forum Neronis*. The pre-Revolutionary cathedral, now the church of S. Fulcran, was founded in the thirteenth century. The bishopric dated from about A.D. 300. Cardinal Fleury was a native of Lodève. Pop. 7,400.

LODGE, Sir Oliver Joseph, English physicist, born 1851. After acting for a time as assistant at the School of Mines, South Kensington, at University College, London, and at Glasgow University, in 1881 he was appointed professor of physics at University College, Liverpool, where he remained till 1900, when he became principal of Birmingham University, retaining this post until 1919. He was knighted in 1902. He was Rumford medallist of the Royal Society (1898), Romanes lecturer at Oxford (1903), president of the British Association (1913–14), Albert medallist of the Royal Society of Arts (1919), as the pioneer in wireless telegraphy, and Faraday Medallist, 1932.

He did a great deal of valuable work in electricity, was a popular lecturer of the highest order, and after the death of Lord Kelvin was regarded as the representative British physicist of the older school. He took an intense interest in psychical research. His son Raymond fell in the European War, and Sir Oliver wrote a book entitled *Raymond, or Life and Death*, which created some sensation. Among his other works are: *Modern Views of Matter, Electrons, The Ether of Space, Modern Problems, Man and the Universe, Christopher: A Study in Human Personality, Evolution and Creation, Modern Scientific Ideas, Science and Human Progress, The Natural History of a Savant, Why I believe in Personal Immortality*, and *Energy*. In 1931 he published *Past Years*, an autobiography.

LODGE, Thomas, English dramatist, born about 1558, died 1625. From Oxford University he entered Lincoln's Inn as a student. He wrote many fine lyrics and other verse; romances, including *Rosalynde, Euphues' Golden Legacie* (1590); and in conjunction with Greene the play *A Looking Glass for London and England* (1594).

LODGER is a tenant who holds part of a house in his exclusive possession, while the landlord or his agent or tenant-in-chief holds possession over the house as a whole. What is known as the *lodger franchise* (parlia-

ntary) was established in England der the Representation of the ople Acts of 1867 and 1868. By any male lodger of full age who cupied rooms for a year continuously evious to the 15th of July in any ar in the same house, and paid for ch rooms, if unfurnished, a yearly nt of at least £10, or if furnished a nt equivalent to one of £10 or more r unfurnished lodgings, might have mself registered as a voter for that ar; but if his right to vote was to ntinue his claim had to be renewed ery year. This franchise could ori-nally be held only in boroughs, but ie Act of 1884 extended it to counties. ow, by the Representation of the eople Act, 1918, the condition of ental value has been abolished, and ie qualifying period has been reduced o six months, ending on 15th January nd 15th July, and otherwise altered. The franchise has, further, been xtended by the Representation of the eople (Equal Franchise) Act, 1928, o any female lodger who has attained wenty-one years of age and is not nder any legal incapacity, and is ntitled to be registered as a local overnment elector in respect of the ccupation of premises of a value of ot less than £5 per annum.

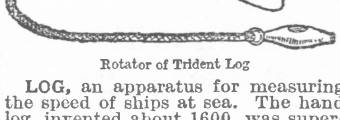
LODI, a town of Italy, province of Milan, on the Adda. Near it lies Lodi Vecchio (Rom. *Laus Pompeia*), one of the bitterest enemies of Milan in mediæval times. The battle for the Bridge of Lodi, 10th May, 1796, ended with the rout of the Austrians by Masséna, and earned for Napoleon the title of 'Le Petit Caporal' and made him master of Lombardy. Pop. 28,000.

LODZ, a town of Piotrkow, Poland, on the Lodka, next in importance after Warsaw, and one of the world's cotton manufacturing centres. It is the head-quarters of a Polish general military district, and was the fifth city of Russia before 1918. It has a broadcasting station (235 M., 2 kw.). Pop. (1931), 605,287.

LO'ESS (pronounced leus), a German term applied to a finely comminuted sand or pulverulent calcareous loam of a yellowish colour which occurs as a deposit sometimes of great thickness, chiefly in the valleys of the Rhine, the Danube, the Hwang Ho, the Missouri, and various other rivers, forming a highly fertile soil. It originates in the sifting by winds of dry alluvial matter, spread out in plains by rivers or by former ice-action; the fine loamy matter accumulates against uplands, and increases in thickness as vegetation grows upon it. Deserts may often be regarded as the barren residues from which fine earth has been removed to form fertile loess-lands elsewhere under the influence of prevalent winds.

LOFODEN ISLANDS, a jagged group off the Norwegian coast, 2° within the Arctic Circle, separated from the Vesteraalen group by the Raftsund, and from the mainland by the Vest-fjord. They are very mountainous, and the combined peaks have been termed the 'Lofoden Wall.' The Lofoden fishery, prosecuted on the east of the group, accounts annually for millions of cod, which are dried, usually on wooden frames, after being cleaned. Thousands of boats take part from all parts of Norway, to whom the islands belong. The Maelström (q.v.) lies south of the Lofodens. The largest island is Hindö. Area of group, 1,565 sq. miles; pop. 41,200.

LOFTUS, urban district of Yorkshire (N.R.). It is 22 miles from Middlesbrough and 259 from London, by the L.N.E. Rly. The chief industry is ironworking. Pop. 7,631.



Rotator of Trident Log

LOG, an apparatus for measuring the speed of ships at sea. The hand log, invented about 1600, was superseded by patent logs of the 'Cherub' and 'Neptune' types, and these in turn are giving place to the 'Trident' and 'Forbes' types.

The hand log consisted of a flat wooden board forming a quadrant of a circle of 6 inches radius, and lead ballasted on the curved part to swim with its plane vertical and the greater part immersed. When dropped over the stern and deprived of the ship's momentum, the log was left behind. The length of line payed out in a given time indicated the approximate speed of the vessel.

Patent logs generally comprise a rotator, line or cable, and a register. The 'Trident' type is practically identical with the 'Neptune,' and is specially designed for registering high speeds (18 knots upwards). The rotator is submerged at the end of the line and connected with an electric register, ticking off each tenth of a mile, and communicating with the fore-bridge indicator. *See* KNOT.

LOGANIA'CEÆ, a natural order of tropical dicotyledonous plants, consisting of trees, shrubs, and herbaceous plants, some of which, as the members of the genus Strychnos, are

remarkable for their poisonous qualities. They have opposite, entire, stipulate leaves, calyx four- or five-parted, corolla four-, five-, or ten-cleft, and stamens varying in number.

LOG'ARITHMS. The common logarithm of a number is the index of the power to which 10 must be raised to be equal to the number. Thus $10^3 = 1{,}000$, so that the logarithm of 1,000 (usually written log. 1,000) is 3. Now $10^1 = 10$, $10^2 = 100$, $10^3 = 1{,}000$, $10^6 = 1{,}000{,}000$, and (*see* EXPONENT) $10^0 = 1$, $10^{-1} = 0{\cdot}1$, $10^{-2} = 0{\cdot}01$, &c., thus:

Log. 0·001	$= -3$	Log.	$10 = 1$
Log. 0·01	$= -2$	Log.	$100 = 2$
Log. 0·1	$= -1$	Log.	$1{,}000 = 3$
Log. 1	$= 0$	Log.	$10{,}000 = 4$

It is evident that the logarithm of any number greater than 1 and less than 10 is fractional; the logarithm of any number greater than 10 and less than 100 is greater than 1 and less than 2. Again, the logarithm of any number less than 1 is negative. Suppose we wish to know the logarithm of the number 18·1. In a book of tables we only find the fractional part of the logarithm; it is ·257679. Now 18·1 is greater than 10 and less than 100, so that its logarithm is greater than 1 and less than 2; hence log. 18·1 = 1·257679. The integral part of a logarithm is called its *characteristic*, the fractional part its *mantissa*.

Logarithms make arithmetical computations more easy, for by means of a table of them the operations of multiplication, division, involution or the finding of roots, are changed to those of addition, subtraction, multiplication, and division respectively. For instance, if x and y are the logarithms of any two numbers, the numbers are 10 and 10^y; now the product of these numbers is 10^{x+y}, so that the logarithm of the product of two numbers is the sum of the logarithms of the numbers. Again, the quotient of the numbers is 10^{x-y}; so that the logarithm of the quotient of two numbers is the difference of the logarithms of the numbers. Again, 10 raised to the nth power is 10^{nx}; so that the logarithm of the nth power of a number is n times the logarithm of the number.

Logarithms of this kind are *common logarithms*, and were invented by Briggs; their *base*, as it is called, is 10. Logarithms were first used by Napier of Merchiston (*see* NAPIER, JOHN). There is another number in common use as a base, namely, the number 2·7182818 . . . ., or the sum of the infinite series $2 + \frac{1}{1} + \frac{1}{2 \cdot 3} + \frac{1}{2 \cdot 3 \cdot 4} +$ &c. This base is denoted by e in mathematical treatises, and *Napierian* logarithm of any numb say 7, is written $\log_e 7$, to distingu it from log. 7, which is the comm logarithm, whose base is 10. T common logarithm of a number found from the Napierian by mu plying by 0·43429448. Napieri logarithms are of great importance the higher mathematics, the ch reason being that the derivative (CALCULUS, THE INFINITESIMAL) $\log cx$ is the very simple function $1/$ and the integral of $1/x$ is $\log x$; t integral is very common in appli mathematics. The function lo $(1 + x)$ can be expanded in ascendi powers of x, if x lies between 1 a -1. The expansion is (*see* MA LAURIN'S THEOREM) $\log_e(1 + x) = x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \frac{1}{4}x^4 + \ldots$.

LOG-BOOK, an official book carrie on board ship, except in ships tradin exclusively between ports on th Scottish coast, in a form approved b the Board of Trade. Every entr must be signed by the master and b the mate or some other of the crew in the case of illness by the surgeon and in the case of wages by the sea man or officer authorized. A recor must be kept of every event on boar ship—boat-drill, changes in crew, con victions against members of crew collisions, &c., &c. A fine is imposed for failure to keep a log-book, or fo destroying, mutilating, or renderin illegible any entry. Log-books must be delivered to the Superintendent o Mercantile Marine within forty-eight hours of a foreign-going ship's arrival at her final port in the United Kingdom, and in the case of transfer of a ship or her loss it must be sent home.

LOGIC is a normative science concerned with ascertaining and describing the standards of thought to which all reasoning, if it is to be valid, must conform. Many logicians maintain that reasoning is a form of discrimination, and that logic really consists of definition. This view, however, ignores the fact that when two or more ideas are connected intelligently a determinate notion is given, and that, as a result of this, knowledge is really a combination of analysis and synthesis, which are two aspects of one process. Reasoning, therefore, is concerned with the clearing up of knowledge, and the complete knowledge of a thing is its ideal definition. Logic is only reached in our efforts to come at this definition.

Before the time of Socrates logic as a science did not exist. Philosophers of the period from the sixth to the fourth centuries B.C., such as Thales, Heracleitus, Parmenides, and Zeno of Elea, were more concerned with the

origin of the world than with the powers of the mind. The nature of the administration of the laws in Athens caused the foundation of the school of philosophers known as sophists, who, without developing a logical theory, taught men to argue on legal subjects. Socrates used their methods for the discovery of truth, and to him we owe the beginning of the inductive method of argument. His theories were amplified by Plato.

Aristotle was the first to undertake a systematic study of logic, and was the originator of the doctrine of the syllogism. His view was, that the essential nature of scientific proof consisted in passing from universal principles to their necessary consequences, or, in other words, in deriving from a universal proposition a dependent conclusion of much less generality.

His logical system is propounded in the collection of treatises known as the *Organon*. The Aristotelian syllogism is the basis of all deductive reasoning. It has been defined as "the act of thought by which from two given propositions we proceed to a third proposition, the truth of which necessarily follows from the truth of these given propositions." The two first propositions are called premises, that which contains the predicate of the third proposition or conclusion being the major premise, and that which contains the subject of the conclusion being the minor premise. These three propositions are made up of three terms, the major, the minor, and the middle, the major and minor terms being those which occur respectively in the predicate and the subject of the conclusion; and by means of the relationship of the major and minor terms, which is expressed in the middle term, a conclusion is reached.

A syllogism to express a valid piece of reasoning must observe certain rules. These are: (1) a syllogism must have three and only three terms; (2) a syllogism must have three and only three propositions; (3) the middle term must be distributed once at least, i.e. must refer once at least to every object in the class it denotes; (4) no term which is not distributed in the premises may be distributed in the conclusion; (5) from two negative or particular premises no conclusion can be inferred; (6) if one premise is negative or particular then the conclusion must also be negative or particular.

Syllogisms are of three kinds, categorical, hypothetical, and disjunctive, and they also differ in figure and in mood. Figure is determined by the order of the terms in the premises, while mood depends on the various syllogistic combinations of propositions according to quantity (universal or particular) and quality (affirmative or negative). Now every assertion is reducible to one of four forms, the universal affirmative, A (all men are mortal); the particular affirmative, I (some men are wise); the universal negative, E (no men are quadrupeds); and the particular negative, O (some men are not wise). As each proposition in a syllogism may have any one of these forms, A, I, E, O, there are 64 possible moods, though, because of the rules of the syllogism, only 19 are valid.

An incorrect performance of the process of reasoning leading to a wrong conclusion is called a fallacy. There are two groups of fallacies, (1) *logical fallacies* occurring in the mere form of statement and requiring no knowledge of the subject-matter for their discovery; (2) *material fallacies* concerned with the subject-matter. Logical fallacies violate the rules of syllogism and include the *Quaternio Terminorum* or fallacy of four terms (violating rule 1); the fallacy of the *undistributed middle* (violating rule 3); the fallacy of *illicit process* (violating rule 4); the fallacy of *negative premises* (violating rules 5 and 6), *equivocation, amphibology, composition, accent, figure of speech*, &c. Material fallacies include the *ignoratio elenchi* or *irrelevant conclusion* (a sound argument with a conclusion not to the point); the *petitio principii*, or *begging the question* (the conclusion itself taken as one of the premises; &c., &c.).

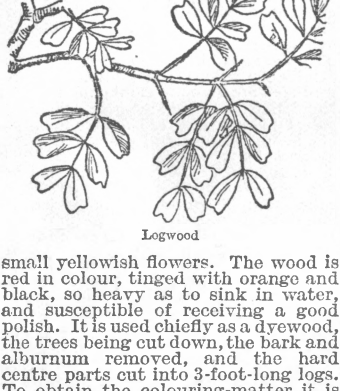
In process of time, however, the syllogism became a mere instrument of theological quibble, and so it is not surprising to find Bacon and Locke advancing the method of induction which states that before theorizing can be attempted, particular instances must be observed. These two may be regarded as the founders of the empirical school, which increased greatly in strength when Kant and his followers put forward a formal conception of logic, that is, of logic dependent on the form of thought and not on the matter cast into that form. In England the leader of this school was Hamilton. On the other hand, Mill strongly upheld the empirical idea that inductive logic was the only logic of truth. Modern logic tends in two directions, one school of logicians upholding an extreme formalism by attempting to express all thought in mathematical symbols, while the other, recognizing that induction is merely the inverse of deduction, has returned to the Aristotelian views. BIBLIOGRAPHY: J. S. Mill, *A System of Logic* (1890); B. Bosanquet, *Logic* (1918);

F. H. Bradley, *Principles of Logic* (1922).

LOGOG'RAPHERS, a term in Greek literature for certain early historical writers previous to Herodotus, using the Ionic dialect, and making no attempt to discriminate between history and legend. The principal logographers were Hecatæus of Miletus, Acusilaus of Argos, Charon of Lampsacus, Hellanicus of Mytilene, and Xanthus of Sardis.

LOGWOOD, a popular name for the *Hæmatoxylon campechianum*, a tree belonging to the nat. ord. Leguminosæ, which grows in moist and swampy places in Central America, and particularly round the Bay of Campeche; but is now naturalized in Jamaica and many of the West Indian islands.

The tree is usually from 40 to 50 feet high, with pinnate leaves and



Logwood

small yellowish flowers. The wood is red in colour, tinged with orange and black, so heavy as to sink in water, and susceptible of receiving a good polish. It is used chiefly as a dyewood, the trees being cut down, the bark and alburnum removed, and the hard centre parts cut into 3-foot-long logs. To obtain the colouring-matter it is hewn into much smaller pieces, and ground or rasped to small chips, or to a coarse powder. The aqueous extract is muddy and of a reddish-brown colour. By acids the red colour is made paler; by alkalies it is converted to purple. By mordanting the fabric with iron, black is produced; with alumina, violet and lilac; with copper, blue; and with chromium, a black or green.

LOH'ENGRIN, son of Parsifal, the hero of a thirteenth-century German romantic poem, and a Knight of the Holy Grail. Sent by King Arthur to help Elsa of Brabant, he arrives in a car drawn by a swan, delivers the princess from captivity by overcoming her enemy Telramund, and marries her; accompanies the emperor in a campaign against the Hungarians, and fights against the Saracens. He then returns to his bride at Cologne, but being pressed by her to state his origin he is prevailed upon to tell it, the car and swan reappearing at once, when he must, in terms of his vow, return to the Grail. The legend inspired Wagner's opera *Lohengrin*, first produced at Weimar on 28th Aug., 1850, under the direction of Liszt (q.v.).

LÖHR, Marie. Australian actress. Born in Sydney, 28th July, 1890, she made her first appearance on the stage in 1894. In 1901 she came to London and made a reputation by acting with the Kendals, Sir H. B. Tree and Sir John Hare. From 1918 to 1925 Miss Löhr managed The Globe Theatre, London, where she produced *A Marriage of Convenience* and other plays.

LOIR (lwär), a river of North-West France, rising in Eure-et-Loir, traversing Loir-et-Cher and Sarthe, and falling into the Sarthe a few miles above its junction with the Loire; length, 185 miles.

LOIRE (lwär; ancient **LIGER**), the longest river of France, which it divides into two nearly equal portions. It rises on the western slope of the Cévennes, in the department of Ardèche, and flows generally N.N.W. and w. till it falls into the Bay of Biscay below Nantes. Its principal affluents on the right are the Arroux, Sarthe, Nièvre, and Maine; on the left the Allier, Vienne, Cher, and Indre. Below Nantes, where it first feels the influence of the tide, it is more an estuary than a river, and is studded with islets. Above Nantes navigation is much impeded by shallows. Its whole course is about 543 miles. The river is much subject to disastrous inundations, and dikes have been constructed along its course. The largest of these is what is known as the Levée of the Loire, extending for about 40 miles below Saumur. Its origin dates as far back as the time of Charlemagne. The river is connected by canals with the Saône, Seine, and Vilaine.

LOIRE, a central department of France, in the Loire basin; area, 1,852 sq. miles. Much wine is produced, and coal is raised, part of the department being in the Loire coal-field, the most important in France. The capital and industrial centre is St. Étienne; other towns are Roanne and Montbrison. Pop. (1931), 664,822.

LOIRE, HAUTE- (ōt-lwär; Upper Loire), a department of South-Eastern France; area, 1,930 sq. miles. It is traversed by the Loire, is surrounded on all sides by the Cévennes, and has the character of a plateau

intersected by deep river valleys. The chief industry is the manufacture of lace, largely a home industry. Le Puy is the capital. Haute-Loire once belonged to the Counts of Toulouse, but was united to the Crown of France in the thirteenth century. Pop. (1931), 251,608.

LOIRE-INFÉRIEURE (lwär-aṇ-fā-ri-*eur*; Lower Loire), a western maritime department of France, intersected by the Lower Loire and its estuary; area, 2,693 sq. miles. The surface is flat. The coast is much indented, and covered with salt marshes. Lagoons and lakes are numerous. The largest is Grandlieu; area, 24 sq. miles. The products are grain, sugar-beet, and large quantities of wine. The oak forests pasture great numbers of swine, and shipbuilding with its allied trades is carried on to a considerable extent. Wine, salt, corn, and cattle are exported. The principal ports are Nantes (the capital) and St. Nazaire.

About the middle of the fifth century inhabitants of Great Britain, expelled by the Saxons, took refuge here and founded the Kingdom of Brittany. At the beginning of the sixteenth century the whole district was united to the Crown of France. Pop. (1931), 652,079.

LOIRET (lwâ-rā), a central department of France; area, 2,629 sq. miles. The surface is partly flat, partly undulating, with scarcely any hills, and is traversed by the Loire, which divides it into two unequal portions. The Loiret is a tributary of the Loire. The chief products are grain and wine. Pottery and porcelain are manufactured. It was united to the French Crown by Hugh Capet. Orleans is the chief town. Pop. (1931), 342,679.

LOIR-ET-CHER (lwär-ē-shār), a central department of France; area, 2,478 sq. miles; traversed by the Loire, Loir, and Cher. Hemp, beet for sugar, wine, fruits, and cereals are produced, and horses, cattle, and sheep are reared. From the time of Louis XII it was frequently the residence of the court, a circumstance which accounts for the remarkable number of châteaux in which the department abounds. The capital is Blois. Pop. (1931), 241,592.

LOJA, a town of Granada, Spain, in the Genil Valley, with a trade in cereals and cattle, and manufactures of leather, silk, and woollens. Pop. 19,330.

LOJA, or **LOXA,** capital of the southernmost province of Ecuador bearing the same name, and in the Casibamba Valley. It is in the gold-, silver-, and copper-mining district, and has a cathedral founded in 1546. It is 6,900 feet in altitude. Pop. (1932), 17,000.—The province is famous for its cinchona forests and exports of cinchona bark. Area, about 3,705 sq. miles; pop. (1931), about 148,000.

LOK, or **LOKI,** in Scandinavian mythology, the evil deity. He did not belong to the race of Æsir, but to an older dynasty. He is a personification of the principle of evil, described as of handsome appearance, but perpetually engaged in works of wickedness partly directed against the other gods.

LOKMAN, a traditional Arabian fabulist, seer, or prophet, represented as the author of a collection of fables of later date than the Hejra. In the *Koran* there is an account of a Lokman the Wise who lived at a time anterior to that of King David. The fables of Lokman were made known to Europe by Erpenius (Leyden, 1615). They were published in Arabic, with a Latin translation.

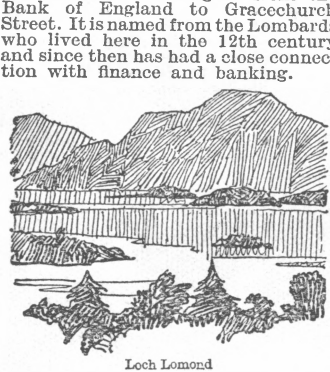
LOLLARDS, a name which arose in the Netherlands about the beginning of the fourteenth century, and was applied as a term of contempt to various sects or fraternities deemed heretical. The name became well known in England about the end of the fourteenth century, when it was applied to Wycliffe and his followers. The Wat Tyler revolt of 1381 was directly connected with the Lollards, who drew on themselves the enmity of the civil powers. Numbers of them were put to death, especially during the reign of Henry V, when apparently another revolt was intended. Lollardy persisted till the Reformation, for which it had done much to prepare the English people.—BIBLIOGRAPHY: E. Powell and G. M. Trevelyan, *The Peasants' Rising and the Lollards*; J. Gairdner, *Lollardy and the Reformation in England*.

LOMBARD, Peter, one of the most celebrated of the schoolmen, born at Novara, Lombardy, about 1100. He was a scholar of Abelard in the University of Paris, and through the influence of Bernard of Clairvaux he became a teacher of theology. In 1159 he became Bishop of Paris, where he seems to have died in 1164. His work *Sententiarum Libri Quatuor* is a classified collection of the opinions of the Fathers on points of doctrine, with a statement of the objections made to them, and the answers given by Church authorities. Hence he is known as the Master of Sentences (Magister Sententiarum). For five hundred years the *Book of Sentences* served as the basis of numerous theological lectures and treatises.

LOMBARD ARCHITECTURE. *See* ARCHITECTURE.

LOM'BARDS, or LANGOBARDI, a Teutonic people who at the beginning of the Christian era were dwelling on the Lower Elbe. With the help of the Saxons and others they conquered North Italy, where they settled, calling the district Lombardy. Their capital was Pavia. The power of the Lombards gradually declined, and in 773 Charlemagne captured Pavia after a six-months' siege and added Lombardy to his own empire.—Cf. T. Hodgkin, *Italy and her Invaders.*

LOMBARD STREET, street in the city of London. It goes from the Bank of England to Gracechurch Street. It is named from the Lombards who lived here in the 12th century and since then has had a close connection with finance and banking.



Loch Lomond

LOM'BARDY, modern *compartimento territoriale* or political division of Upper Italy, deriving its name from the Lombards. At first it extended from the Adriatic to the Savoyan Alps. After the overthrow of the Lombard Empire a number of independent duchies and republics, Mantua, Milan, Venice, Genoa, &c., evolved, originally fiefs of the Holy Roman Empire, but practically independent. On the west side the growth of the House of Savoy ultimately absorbed all minor principalities to the line of the Ticino, while the extension of the Venetian authority during the sixteenth century over the districts to the east restricted the use of the name of Lombardy to the country west of the Lago di Garda and the Mincio, a district which passed under the dominion of Austria in 1706, and was ceded by that power to Italy in 1859. The modern *compartimento* embraces nine provinces (Bergamo, Brescia, Como, Cremona, Mantua, Milan, Pavia, Sondrio, and Varese), with an area of 9,190 sq. miles and a pop. of (1931), 5,545,307.—Cf. Countess Martenengo Cesaresco, *Lomb Studies.*

LOMBOK, an island of the Su group, Dutch East Indies; of volca origin. It is mountainous and t versed by two ranges, between wh the valley yields rice, cotton, mai coffee, and tobacco. The ranges c minate in the peak of Rinjani (12,: feet). Mataram (capital) and A panam (port) are the chief towns. T Dutch have occupied the island sir 1894. Area, about 3,060 sq. mil pop. about 701,117.

LOMBROSO, Cesare, criminologi born, 1836, at Verona of Jewi parents, died 1909. He studied Turin, became an army surgeon, a was appointed to the chair of psycl atry at Pavia in 1862, transferri later to Turin. His work was main connected with criminal insanity, t connection between genius, insanit and crime, and anthropometry in i relation to criminality.

He is famous for his *L'Uomo Del quente* (The Criminal; 1885). H theory as promulgated is that t anomalies of the criminal type, phy ical and mental, are due partly t degeneration and partly to atavisn

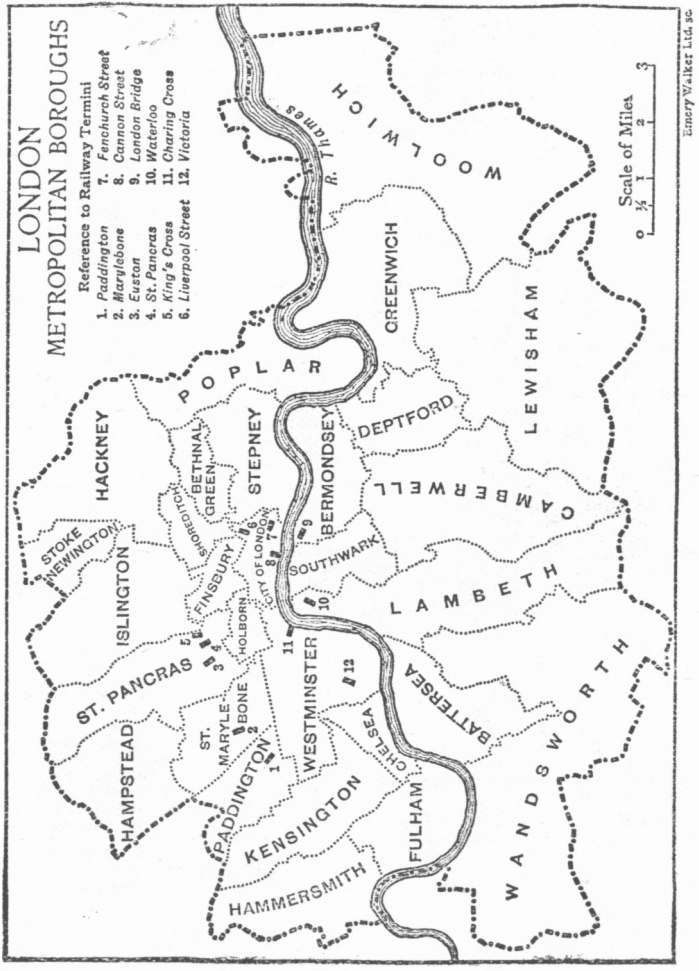
LOMOND, LOCH, the 'Queen Scottish Lochs,' and the larges renowned for its scenic beauty. It 24 miles long, and 600 feet deep i parts of the narrows. It is the *Le manonius Lacus* (lake of the elms) c Ptolemy, and is drained by the Lever The southern part of the loch i island-studded, and Inchmurran con tains a castle of that name. Be Lomond (3,192 feet) towers abov Tarbet on the opposite shore. Fish including salmon, trout, and pike are abundant. A regular steamer ser vice is maintained from Balloch in the south, and a railway connects Ardlu in the north with Glasgow and the Clyde. Area of loch, 27 sq. miles.

LOMZA, a town of Poland, in the province of Bialystok, on the Narev, a tributary of the Bug. Pop. 31,784.

LONDON, the political and commercial capital of the British Empire, and by far the largest city in the world. It is situated upon the River Thames, covering an area of 443,455 acres, and having a pop. of 8,202,818 in 1931 (7,480,201 in 1921, and 7,251,358 in 1911). This area is known as Greater London, which includes the City, the counties of Middlesex and London, and parts of Kent, Surrey, Herts, and Essex; technically, any parish within 15 miles of Charing Cross is in Greater London. The administrative county of London and City of London has an area of 74,850 acres, and a pop. of 4,396,821 in 1931 (4,483,249 in 1921,

and 4,521,685 in 1911), all under the jurisdiction of the London County Council. The City of London proper is a comparatively small place, comprising 677 acres and a floating population. It is almost entirely the business quarter, and is a separate municipality with a civic corporation, the Lord Mayor of London being at its head.

London consists of a number of quarters or districts, the most important of which form separate parliamentary boroughs, though there are many other equally familiar minor districts, such as Shepherd's Bush (known through the Franco-British and other gigantic exhibitions, and as a barracks during the European War), Whitechapel Spital-



fields, Pimlico, Bloomsbury, and Belgravia.

An unofficial division of London is into the west, or fashionable quarter, and the east end, the great seat of trade and manufactures. The general appearance of London is not attractive, much of the architectural beauty being lost by overcrowding and badly-chosen sites; but what impresses a stranger is not so much the design of the buildings as the number of them, and the immensity of the Metropolis can only be realized by actually travelling about within it.

London Parliamentary Boroughs.	Population in 1921.	Population in 1931.
Battersea	167,693	159,542
Bermondsey ..	119,435	111,526
Bethnal Green ..	117,238	108,178
Camberwell ..	267,235	251,373
Chelsea	63,700	59,026
City of London	13,706	10,996
Deptford	112,500	106,886
Finsbury	76,019	69,888
Fulham	157,944	150,940
Greenwich ..	100,493	100,879
Hackney	222,159	215,380
Hammersmith ..	130,287	135,521
Hampstead ..	86,080	88,914
Holborn	42,796	38,816
Islington	330,028	321,712
Kensington ..	175,686	180,681
Lambeth	302,960	296,162
Lewisham	174,194	219,942
Paddington ..	144,273	144,950
Poplar	162,618	155,083
St. Marylebone ..	104,222	97,620
St. Pancras ..	210,986	198,113
Shoreditch ..	104,308	97,038
Southwark ..	184,888	171,657
Stepney	249,738	225,203
Stoke Newington	52,167	51,215
Wandsworth ..	328,656	353,101
Westminster ..	141,317	129,535
Woolwich	140,403	146,944

Note.—These boroughs are treated under their individual headings, and it is the City of London that is mainly dealt with here.

Buildings. As the capital of the empire London is the residence of the sovereign and court, Buckingham Palace being the King's official residence, and St. James's Palace that of the Prince of Wales. Marlborough House and Kensington Palace are also royal residences.

As the empire's administrative centre, London also contains the Government offices, and these are mainly located in and contiguous to Whitehall.

Westminster Hall, adjacent to the Houses of Parliament, was erected by William Rufus, and was formerly the seat of the Supreme Court. Adjoin the City, on the east, is the Tower, ancient citadel of London, on bank of the Thames. Other n worthy buildings are the Houses Parliament, Law Courts, Bank England, Royal Exchange, Mans House, Guildhall, and the four I of Court. Among churches are Paul's Cathedral and Westmins Abbey.

There are many monuments: Nelson Column in Trafalgar Squ is 176½ feet high, with four colos lions by Landseer adorning the ba the national memorial to Pri Albert is 176 feet high; the enorm memorial to Queen Victoria, ec structed of white marble, is conspicuc before the gates of Buckingham Pala The Monument in Fish Street Hi 202 feet high, commemorating t Great Fire of 1666; and a simp cenotaph in Whitehall perpetuates t memory of the 'glorious dead' wh fought in the European War.

Transport. A labyrinth of railwa lines converges on London. Group round King's Cross are Euston, S Pancras, and King's Cross, termin stations of the northern system From Victoria lines radiate in a directions, but mainly south, east, an west. Waterloo, Marylebone, Pad dington, Charing Cross, and Liverpo Street are all busy terminal station The docks must also be considere from a transport standpoint, main taining as they do a regular com munication with all parts of Europ and the world. A unique feature o the Metropolis is the undergroun railway system, 'The Tube,' a high speed method of point-to-point travel ling, with an almost perfect organiza tion for securing speed with comfort The omnibus system is the main street service, although some parts of the Metropolis are served by electric tramways which travel for a distance, notably between Holborn and the Embankment, under the ground. In July 1933, the Suburban railway, tube and omnibus services were co-ordinated as the London Passenger Transport Board. There are airports at Waddon and Hanworth.

Thoroughfares. The street plan of London is comparatively simple, and may readily be grasped upon a study of the 'trunk lines' of prominent thoroughfares leading from one part of the Metropolis to another. Such a thoroughfare is formed by Trafalgar Square, Strand, Fleet Street, St. Paul's; and by Marble Arch, Oxford Street, Holborn, Holborn Viaduct, Mansion House; or by Euston Road, Pentonville Road, City Road. Many streets are especially connected with specific occupations, i.e. Savile Row

is associated with men's tailors, Fleet Street with newspapers, Burlington Arcade with fashionable haberdashers, and Bond Street with jewellers. Pall Mall is the head-quarters of fashionable clubland.

Trade. London is an extensive trading city, and has also some claim to be considered a manufacturing area. If it is not the head-quarters of every leading British firm, every firm of any size in the United Kingdom has its London office or warehouse, and the commercial houses of the world have branches or agencies there. London owes its commercial strength and energy to the regularity with which it draws upon everybody and everything from its own suburbs to the ends of the earth.

Many districts, as the streets mentioned elsewhere, are connected with specific industries, e.g. Clerkenwell is the seat of watch-making, Lambeth has potteries, Whitechapel and Stepney are synonymous with tailoring, and matches are made at Bow. Almost every manufacturing industry is followed, but London is primarily a commerical and not a manufacturing city. By far the greatest number of manufacturers are engaged in clothmaking, and the next departments of manufacture in order of importance are: paper and printing; metals and machinery; woodworking; food, drink, and tobacco; fine instruments, chemicals and drugs; gas and electricity; skins and leather; stone, bricks, and glass.

Markets. There are nine principal markets in London. (1) Billingsgate, the fish market; (2) Smithfield, the head-quarters of the dead-meat trade; (3) Leadenhall, fish, meat, and poultry; (4) Covent Garden, vegetables, fruit, and flowers; (5) the Metropolitan cattle market, Holloway, for live cattle, sheep, and pigs; (6) the foreign cattle market, Deptford, for the sale of imported cattle; (7) Spitalfields, the East London vegetable market; (8) Stratford, fish, fruit, and vegetable market; and (9) Southwark (the 'Borough') market, which is also for fruit and vegetables.

Port of London. A most extensive trade is carried on between the Port of London and all parts of the world, and the coasting trade is immense. A long chain of docks extends for miles from the Tower to Millwall, thence to beyond North Woolwich and to Tilbury, but their size and their importance is never immediately noticeable, for they are almost lost to view in the vastness of the crowded Metropolis.

The Port of London Authority was created in 1909 to control the ports and docks of London and the River Thames from Teddington to the sea. Prior to this date the Thames Conservancy and Dock Companies were absolute. As constituted, the Authority consists of a chairman, vice-chairman, eighteen selected and ten appointed members, while one or two experts may be appointed by the Board of Trade. The Authority absorbed the London and India Docks, Surrey Commerical Docks, Millwall Docks, and the Watermen's Company.

Amusements. London is one of the greatest entertainment centres of the world, and is the home of all new plays, the Mecca of stock companies within the British Isles. Nearly all of the theatres are to be found within a limited area, appropriately termed 'Theatreland.' Covent Garden was renowned for grand opera, and Drury Lane is invariably associated with Christmas pantomime and melodrama. There are 73 theatres and 28 music halls in the city and suburbs. Picture-houses include the magnificent London Opera House in Kingsway. The Royal Albert Hall seats 8,000 comfortably; frequently exhibitions are held at Olympia; the Agricultural Hall, Islington, is the yearly scene of the British Dairy Show; Madame Tussaud's Waxwork contains a collection of all celebrities, notorieties, and some nonentities in wax; and the Crytsal Palace contains a war museum. London is the broadcasting centre for the British Isles. London Regional broadcasts are made on a wave length of 356 M., 50 k.w; London National on a wave-length of 261·6 M., 50·3 k.w.

Sports. Football is well catered for in London, which has several well-known teams and grounds, e.g.

Tottenham Hotspur (Tottenham).
Woolwich Arsenal (Highbury).
West Ham United (Upton Park).
Fulham (Craven Cottage).
Clapton Orient (Lea Bridge).
Queen's Park Rangers (Shepherd's Bush).
Brentford (Griffin Park).
Millwall (New Cross).
Chelsea (Stamford Bridge).
Crystal Palace (Selhurst).

Association football is more popular than Rubgy. The football ground of the Rugby Union is at Twickenham. Lord's, the M.C.C. head-quarters, and Kennington Oval (Surrey C.C.) are famous in the world of cricket. Lawn tennis championships are decided at Wimbledon and at Queen's Club, West Kensington.

Historical. The modern name London is derived from the Lat. *Londinium*, a Roman corruption of the Brit. *Llyn* or *lin*, a pool, and *din* or *dun*, a stronghold, hill-fort, or city. The

'pool' was an expansion of the river at this point, and is still known by that name. The British or Welsh name for London is *Llundain*, but it was formerly known to the Welsh as *Caerludd* (City of Ludd), who was a British ruler of the pre-Roman period, and is even now commemorated in Ludgate (Lud-gate), a gate of the ancient walled city.

Celtic Britons. By the evidence of its name, and by the proof of archæological remains, there can be no doubt that London was occupied by the Celtic Britons prior to the Roman occupation, and that it was a settlement in a clearing of the primeval forest, or a camp on a dry spot in the marshy district which then existed in and around the site of modern London.

Romans. Following upon the Roman colonization, Londinium developed into a place of considerable commercial importance, and there were possibly two settlements of that name, the first destroyed by Boadicea (about A.D. 61) and rebuilt by Theodosius (about 306), the second town being coincident with the mediæval walled city. From the Roman Londinium great roads radiated, passing through the walls by various gates and reaching the farthest outposts of the Roman colony. The extent of the town may be estimated by following the chain of gates named as under, the nomenclature being preserved in modern London:

Lud-gate.	Postern-gate.
Dour-gate (Dowgate).	Old-gate.
Belins-gate (Billingsgate).	Bishops-gate.
Crepel-gate (Cripplegate).	Moor-gate.
Alders-gate.	New-gate.

Londinium was not the capital of Roman Britain, and was never a *municipium* like *Eboracum* (York) or *Verulamium* (St. Alban's).

Saxons. The Roman walls were destroyed by the Danes and restored by King Alfred, the first English king to realize the military importance of the City of London, which, in A.D. 893, became capital of the kingdom. The present sites of Westminster Abbey and St. Paul's were then occupied by churches. London was sacked by the Danes, who obtained a considerable settlement in Southwark, and on the western boundary of the city beyond Ludgate.

Norman Conquest Onwards. At the Conquest London submitted to William and received a charter of freedom, but the city was dominated by a military stronghold, the White Tower of the present Tower of London. The first Lord Mayor was appointed in 1190. London sided with Stephen against Matilda, struggled against John for Magna Charta, strongly supported Edward IV and the Yorkists in the Wars of the Roses, and was faithful to Richard III. It fought for the Parliament against Charles I. Under the late Stewarts and the early Hanoverian dynasty it became more political than municipal, and lost much of its ancient power.

Progress of the City. In the reign of Henry II the walls on both sides of the river are described in a contemporary account as being furnished with numerous towers. London Bridge, replacing a wooden one, was begun in 1176 and completed in 1209, remaining intact for the most part until its demolition in 1832. In 1218 the forest of Middlesex was cleared, water-pipes were introduced (1236), and coal became known a few years later. London was visited by the plague in 1349 and 1361. Wat Tyler's rebellion broke out in 1381, and Tyler fell at the hands of the Lord Mayor. This combat is commemorated by the dagger on the city arms. Street lanterns were introduced about 1416, some of the main streets were paved, and wood was rapidly replaced by brick in building construction.

In the seventeenth century hackney coaches came into general use, but the streets were so narrow and so filthy, and the houses so insanitary, that the city was never entirely free from the plague. The Great Fire of London destroyed upwards of 90 churches and 13,000 houses in 1666, and was a blessing in disguise, for in rebuilding considerable improvements were made in town planning and building construction, so that London became healthier and wealthier than ever. A fire in Southwark ten years later afforded an opportunity of amelioration in that district also. The population and commerical activity increased, partly through the influx of Huguenots after the revocation of the Edict of Nantes.

During the eighteenth century the city steadily progressed. The Gordon Riots took place in 1780, when the mob was in possession of London for two days and worked enormous havoc.

One of the most remarkable events of the nineteenth century was the organization of the mammoth exhibition of 1851, the original 'International' exhibition, upon the lines of which all others have since been based. A second one was held in 1862, and the Franco-British, Japan-British, and others were subsequently opened in the White City, Shepherd's Bush. Since that time perhaps the most tremendous events in the history of London may be considered as those leading up to and following upon the declaration of war, 4th Aug., 1914. In the events which followed, London was the ob-

jective of all enemy airmen, and suffered severely.

The post-war building and rebuilding changes in London are impressive. In the West End new and magnificent buildings have been erected on the sites of old. Notable among them are the Shell-Mex building, Broadcasting House, The Masonic Temple, Dorchester House, Grosvenor House and the County Hall of Westminster. Thousands of acres within a twenty mile radius of the City have been covered with housing schemes.

Modern Government. The government of London, County, City, and Borough, is altogether exceptional, and there is no chief authority for the whole, owing to the historic independence of the Corporation of the City of London. The government is therefore shared by the Common Council of the City, the London County Council, the London Borough Councils, and the special authorities dealing with the poor-law, asylums, education, water, the Rivers Thames and Lea, and the Port.

City Corporation. The City Corporation is founded on charters which go back to Saxon times. The Mayor, Commonalty, and Citizens or Common Council is the ancient City Corporation, and consists of a Lord Mayor and 25 other Aldermen, with 206 Common Councilmen. The method of election of the Lord Mayor is that the members of the Livery Companies nominate two candidates eligible for office, the final selection resting with the Aldermen. Aldermen are elected for life, for each ward at *wardmote*, and are also the Magistrates for the City.

Borough Councils. The municipal government of London outside the City is in the hands of 28 Borough Councils, each composed of a Mayor, Aldermen, and Councillors, but they have no educational authority, this being vested in the London County Council.

London County Council. London County Council is the largest and most important of all the County Councils in the country, comprising 124 elected Councillors and 20 Aldermen (*see* LOCAL GOVERNMENT). It maintains the Metropolitan Fire Brigade, and supervises the Borough Councils, who maintain bridges outside the City and regulate traffic and street names. By the Local Government Act of 1929 it now functions in place of the old Guardians of the Poor.—BIBLIOGRAPHY: H. B. Wheatley, *Story of London* and *London Past and Present*; A. St. J. Adcock, *A Short History of London*; L. Hutton, *Literary Landmarks of London*; L. Wagner, *A New Book About London*.

LONDON, a city of Middlesex county, Ontario, Canada, founded in 1825. It is a junction on the Canadian National and Canadian Pacific Railway systems, and is served also by a tramway system terminating at Port Stanley, Erie. London is the centre of a prolific agricultural district, and has a large implement trade. The Western University was established in 1878. Street names are taken from those of the city of London, England. Pop. (1931), 71,022.

LONDON, UNIVERSITY OF, was originally established as a joint-stock undertaking in 1825. In 1836 two charters were granted, one to London University, with power merely to examine and grant degrees, another to a teaching body occupying the original premises in Gower Street, which took the name of University College. Supplementary charters were granted in 1858, 1863, and 1878, the last admitting women to all degrees and prizes.

The university itself still continued to confer degrees simply, but by an Act passed in 1898 provision was made for its reconstruction, whereby it should become both a teaching and an examining body; and in accordance with regulations, coming in force in 1900, the university embraces a number of institutions, in which students receive instruction in all branches of knowledge. These include the Imperial College of Science and Technology, the London School of Economics, Birkbeck College, East London College, Bedford College, the Royal Holloway College, Cortauld Institute of Art, and the Institute of Historical Research, and a number of metropolitan institutions, medical, theological, scientific, &c.; the faculties of the university are theology, arts, science, engineering, political science (including commerce and industry), economics, engineering, law, music, and medicine.

The university still continues to confer degrees on all comers after examination, admitting as a candidate any person who is above sixteen years of age. Provincial examinations are carried on simultaneously with the London ones. The university of London returns one representative to Parliament. Its head-quarters are meantime in the Imperial Institute, South Kensington. A Royal Commission was appointed in 1909 for the purpose of inquiry into university education and recommended important changes (1913) (*see* UNIVERSITIES). In May, 1920, the Government offered a new site in Bloomsbury for the building of a new university. A vast and imposing building is now in course of erection, the foundation stone having been laid by King

George V, June, 1933. The university has athletic grounds at Motspur Park, near Worcester Park, Surrey.

LONDON GAZETTE, THE, official organ of the British government. It appears twice a week, on Tuesday and Friday, and contains proclamations and official announcements generally. For Scotland a similar purpose is served by *The Edinburgh Gazette*, and for Northern Ireland by *The Belfast Gazette*.

LONDON, Jack, American novelist. Born in San Francisco, 12th Jan., 1876, he started upon a career of adventure by digging for gold in Klondike. Afterwards he travelled over a good part of North America on foot, worked as a seaman and, in 1904–05, London served as a war correspondent in Manchuria. About 1900 he began to write and his books became very popular. He put into them much of his own adventurous career and a remarkable knowledge of certain forms of animal life. They include *A Daughter of the Snows, The Call of the Wild, White Fang, Martin Eden, The Mating of the Elsinore* and *Night Born*. He died 22nd Nov., 1916.

LONDONDERRY, Robert Stewart, second Marquess of, British statesman prominent as Viscount Castlereagh, was born in 1769, and committed suicide when of unsound mind in 1822. In 1814 he was a member of the Congress of Vienna and became very unpopular through his support of the Holy Alliance.

LONDONDERRY, a city and seaport of Northern Ireland, capital of County Londonderry, on the River Foyle. The city stands partly on a hill crowned with the Protestant cathedral of St. Columba (1633), and still retains its seventeenth-century walls, though the buildings now stretch far beyond them. There is a Roman Catholic cathedral. Magee College has courses in arts and theology, the latter specially adapted for Presbyterian students. The harbour is commodious, and an extensive trade is carried on.

Linen is manufactured, and there are shirt-factories, timber-mills, grain-mills, foundries, and distilleries, &c.

Derry originated in a monastic establishment erected by Columba in 546. The Corporation of London, who obtained a grant of the town from James I, fortified it, and gave it the name of Londonderry. Here the Protestants of Ulster took refuge at the Revolution, and made a famous defence against the forces of James II, the siege lasting from the 18th April till the 30th July, 1689. Pop. (1926), 45,164.

LONDONDERRY, a maritime county of Northern Ireland; area, 816 sq. miles. It consists partly of wild and bleak tracts of mountain and moor, partly of flat alluvial lands. The principal rivers are the Foyle, the Faughan, the Roe, the Bann, and the Moyola. The fisheries are important. The staple manufacture is linen. Londonderry is the chief town, and Coleraine next in size.

A great part of the county formerly belonged to the Irish Society and the Mercers' Company (London), having been granted to the Common Council of London and the Livery Companies by James I in 1609, after the flight of the Earls of Tyrone and O'Donnell, but has now been sold. Pop. (1926), 139,675.—Cf. J. W. Kernahan, *The County of Londonderry in Three Centuries*.

LONDON-PRIDE (*Saxifrăga umbrōsa*), a perennial evergreen plant of the Saxifrage order. It has flower-stems 6 to 12 inches high, with small spotted pink flowers. It thrives in the smokiest towns.

LONG, VISCOUNT. English politician. **Walter Hume Long** was born 13th July, 1854, at Bath, was educated at Harrow and Christ Church, Oxford, and inherited estates in Wiltshire. He began his parliamentary career in 1880 as Conservative member for North Wiltshire, and although he changed his constituency several times, he retained his seat in the House of Commons until 1921, when he was created a peer. He was President of the Board of Agriculture, 1895–1900 and of the Local Government Board, 1900–05. In 1905 he was for a short time Chief Secretary for Ireland. In 1915, under the Coalition ministry, he was again President of the Local Government Board, in 1916 Colonial Secretary, and in 1919–21 First Lord of the Admiralty. He died Sept. 26th, 1924, having been created Viscount Long of Wraxall in 1921. He lost his elder son, Brig.-Gen. Walter Long, C.M.G., D.S.O., in the Great War, and was succeeded in his title by his grandson.

LONG, LOCH, an arm of the Firth of Clyde separating Dumbarton from Argyll. The London and North-Eastern Railway serves the east side to Portincaple, and Arrochar at the head of the loch. At Ardentinny Loch Goil branches to the left, passing the ancient Carrick Castle and extending to Lochgoilhead, where Glasgow owns a large mountainous estate (Ardgoil).

LONGBENTON, urban district of Northumberland, also known as Benton. It is 4 miles from Newcastle and 273 miles from London by the

L.N.E. Rly. Here are stone quarries and coal mines. Pop. (1931) 14,072.

LONG BRANCH, a watering-place of Monmouth county, New Jersey, United States. The permanent population is about 18,309, but during summer is frequently increased by 30,000.

LONGCHAMPS, racecourse of Paris. It is in the Bois de Boulogne and here the race called the Grand Prix is run. There are slight remains of an abbey here.

William de Longchamps was chancellor of England in the time of Richard I. He died 31st Jan., 1197.

LONG EATON, an urban district and town of Derbyshire, on the L.M.S. Railway. Its manufactures are lace-making and railway-carriage building. Pop. (1931), 22,339.

LONGFELLOW, Henry Wadsworth, American poet, was born 1807, died 1882. He was educated at Bowdoin College, and distinguished himself therein the study of modern languages, publishing some short poems, including the *Hymn to the Moravian Nuns*. In 1826 he accepted the professorship of modern languages at Bowdoin, being allowed three years to prepare himself for the post by study and travel in Europe.

In the year 1835 he was appointed to the chair of modern languages at Harvard, and, after spending another year in the study of Scandinavian languages and literature, he entered on his professorship (1836), retaining it until 1854, when he resigned.

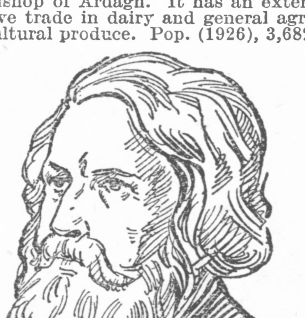
During this period all his most important poems appeared, quite devoid of Americanism in thought or expression, and gained for Longfellow the approbation of Europe in addition to his American popularity. In 1868–9 he again travelled in Europe, receiving honorary degrees from Cambridge and Oxford.—BIBLIOGRAPHY: Samuel Longfellow, *Life of Henry Wadsworth Longfellow*; P. Morin, *Les Sources de l'Œuvre de Henry Wadsworth Longfellow*; M. Stevenson, *The Spiritual Teaching of Longfellow*.

LONGFORD, village of Wiltshire. It is on the River Avon, 2 miles from Salisbury. Here is a castle built in the sixteenth century and restored in the nineteenth. It contains a wonderful collection of pictures and is the seat of the Earl of Radnor.

LONGFORD, an inland county of Leinster, Irish Free State; area, 257,935 acres, exclusive of water. The county is watered by the Shannon and Inny, and is connected with Dublin by means of the Royal Canal. The Shannon, falling into Lough Ree, provides an inland waterway to Limerick, and the Midland and Great Western Railway from Dublin, via Mullingar, traverses the county. The flat countryside is studded with peat-bogs, especially around Lough Ree, but generally stock-raising and dairy-farming and, in the south, cereal and green forage cropping are practicable and widely practised.

The chief town is Longford. Longford county was originally a part of Meath and afterwards of Westmeath, and emerged as a county in 1560. It was occupied by the English in the reign of Henry II. Pop. (1926), 39,847.

Longford, the county town, stands on the Camlin, and is the seat of the Bishop of Ardagh. It has an extensive trade in dairy and general agricultural produce. Pop. (1926), 3,682.

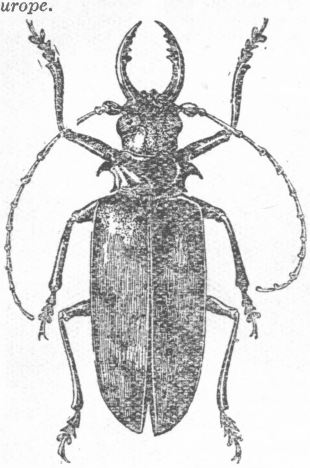


Henry Wadsworth Longfellow

LONGICORN BEETLES (Cerambycidæ), a family of Coleoptera, including a vast number of large and beautiful beetles, all remarkable for the length of their antennæ, which, in the males of some of the species, are several times longer than their bodies. The females deposit their eggs beneath the bark of trees by means of a long, tubular, horny ovipositor, and the larvæ are very destructive to wood.

LONGINUS, Dionysius Cassius, Greek rhetorician and philosopher, born at Athens or Emesa (a disputed point) about A.D. 213, and executed by the Emperor Aurelian A.D. 273. He taught criticism, rhetoric, and grammar at Athens, visited the East, and became counsellor to Zenobia, Queen of Palmyra, whom he encouraged in an unsuccessful revolt against Rome. Only fragments of his works are extant, and the treatise *On*

Impressiveness of Style (*Peri Hypsous*), long ascribed to Longinus, is now supposed to belong to the first century A.D.—Cf. G. E. B. Saintsbury, *History of Criticism and Literary Taste in Europe*.



Longicorn Beetle

LONG ISLAND, an island of New York, United States; area, 1,682 sq. miles. It is divided into four counties, King's, Queen's, Suffolk, and Nassau, and is extensively wooded. In 1776, during the War of Independence, the British defeated the Americans in the battle of Long Island. Long Island is a great residential area for business men of New York City, the western part being actually a part of the city, and separated from the mainland by the East River, at this point only half a mile wide.

Coney Island is at the south-west extremity; Rockaway Beach is a watering-place, and Sheepshead Bay Racecourse is well known. There are also flying-grounds, motor-racing courses, golf-courses, and rifle-ranges of importance. It has two broadcasting stations (62·5M., and 34·68M.). Pop. about 2,500,000.

LONG ISLAND. *See* BAHAMA.

LONG ISLAND CITY, a part of New York City, Queen's Borough, Long Island, separated from Brooklyn by Newtown Creek. It was settled by the Dutch in 1640, and became a city in 1870, merging with New York in 1898. It has a frontage of some 10 miles to East River.

LONG ISLAND SOUND, a broad arm of the sea separating Long Island from Connecticut and New York, 110 miles long, and connected with New York Bay by East River (q.v.) and Hell Gate.

LONGITUDE, in geography, the distance of a place east or west from a meridian taken as a standard or prime meridian, this distance being measured along the equator or a parallel of latitude; in other words, it is the angle between the meridian plane of a place and the prime meridian plane. Longitudes are now generally reckoned from the meridian of Greenwich (*see* MERIDIAN).

Since the parallels of latitude get smaller towards the poles, at which all the meridians converge, it is evident that degrees of longitude, which are 69½ statute miles long at the equator, get shorter towards the poles, at which they finally become zero, as will be understood from the diagram below. As the earth makes one revolution on its axis, that is, turns through 360° of longitude from west to east, in twenty-four hours, if the sun or a star is on the meridian of any place at a particular time, it will be on the meridian of another place 15° west of the first in one hour.

Thus 15° of longitude represent one hour of difference in time, and hence longitude may be easily determined by comparison of the local time with the indication of a chronometer set to Greenwich time, which is the method commonly employed at sea. Longitude is reckoned to 180° eastward or westward of the fixed meridian (*see*

Map showing lines of Longitude

DAY). The latitude and longitude of a place enable us to fix its exact position on a map or globe.

LONG PARLIAMENT, the name commonly applied to the fifth and last Parliament of Charles I, which succeeded the 'Short Parliament,' and met 3rd Nov., 1640. Among its

early acts were the impeachments of Laud and Strafford and the abolition of the Star Chamber. In 1647 Charles was delivered up to the Parliament, and in Dec., 1648, 'Pride's Purge' excluded from the Commons ninety-six members who were obnoxious to the army; the remainder were henceforth known as the 'Rump.'

The king's trial and execution took place in Jan., 1649, and in the following May the Commonwealth was proclaimed. The 'Long Parliament' finally decreed its own dissolution on 16th March, 1660, thus having lasted for twenty years.

LONGPORT, variety of English chinaware. It takes its name from Longport, near Burslem, where it was made in the 18th and 19th centuries. It is a porcelain with a hard transparent body beautifully decorated.

LONGRIDGE, urban district of Lancashire. It is 7 miles from Preston on the L.M.S. Rly. The main industry is cotton spinning. Pop. (1931) 4,158.

LONGTON, district of Stoke-on-Trent. On the L.M.S. Rly., it is a centre of the pottery industry, and was a separate borough until it was incorporated in 1910 with Stoke-upon-Trent (q.v.).

LONGWY (lon-vi), a town of Meurthe-et-Moselle, France, near the Belgian frontier, and before the European War a fortress of the second class. It was called by Louis XIV 'the iron gate of France.' In 1870 it capitulated to the Germans. Pop. about 10,000.

LONGYEARBYEN, a mining camp on Advent Bay, Spitsbergen. Pop. (1930), 550.

LONSDALE, EARL OF. English title borne by the family of Lowther. In 1696 Sir John Lowther, a rich baronet in Cumberland, was made a viscount, but the title became extinct in 1750. His estates came to Sir James Lowther who, in 1784, was made Earl of Lonsdale, but this title became extinct when he died in 1802. In 1807 Sir William Lowther was made Earl of Lonsdale and from him the present earl is descended. **Hugh Cecil Lowther,** who, in 1882, became the 5th earl, has won a great reputation as a sportsman. His seat is Lowther Castle, Penrith.

LONS-LE-SAUNIER (lon-le-so-nya), a town, capital of the department of Jura, France, and the birth-place of Rouget de l'Isle, author of the *Marseillaise.* It is a railway junction, and has a trade in salt and wine. Near by are Montmorot brine springs. Pop. 12,481.

LOO (formerly called *lanterloo*), a card game for two or more persons, each of whom has three cards dealt, while an extra hand, called 'miss,' is also dealt. A trump card is then turned up, and each player, after having declared whether he will play, take miss, or throw up his hand, plays one card in order, tricks being taken as in whist. The winners of the tricks divide the pool between them proportionately, each player having previously contributed to the pool, and the dealer having put in double. The game is still played, but was extremely popular in the early eighteenth century.

LOOE, a fishing port and watering-place of Cornwall, England. It stands where the River Looe flows into Looe Bay, 16 miles. from Plymouth, on the G.W. Rly. Pop. (1931), 2,878.

LOOS, village of France. It is 3 miles from Lens and is a coal mining centre. It was destroyed during the Great War, but has since been rebuilt.

Battle of Loos. The village gives its name to a battle of the Great War, fought 25th Sept.–13th, Oct. 1915. The object of the Allies was to recover Lens and the surrounding coal mines from the Germans. The main attack was made between Lens and La Bassée, by a British and a French army, with subsidiary movements elsewhere. The advancing troops were at first very successful, Loos itself was entered by a London division and the German front was broken, but for several reasons the gains could not be held. On the next day (26th Sept.) German reserves arrived and there was some fierce fighting, which continued on the 27th. Incidents were the attack of the Foot Guards on Hill 70 and the French attempts to take Souchez. The battle proper ended on the 28th, but there was a good deal of fighting until 13th. Oct. Some of the gains, including Loos, were retained by the Allies, but at a tremendous cost. The British lost perhaps 60,000 out of 250,000 engaged.

LOPEZ, Francisco Solano, President of Paraguay, born at Asunción in 1827, and killed in 1870. His early education was neglected during the dictatorship of Francia. In his eighteenth year his father made him a brigadier-general in the war against Rosas, the dictator of Buenos Ayres, but he took no actual part in the struggle. He afterwards filled some of the principal offices of State, and was sent to Europe in 1853, accredited to the chief courts there. In 1855 he returned to Paraguay, became Minister of War, and on the death of his father, in 1862, President for ten years.

He had long been aiming at the foundation of a great inland empire,

and as his military preparations were now complete, and his army superior to that of any of the Latin-American States, he declared war against Brazil in 1864. The Argentine Republic and Uruguay allied themselves with Brazil, and after five years' conflict Lopez, reduced to extremities, was finally surprised on the banks of the Aquidaban by a troop of Brazilian cavalry and killed.

LOPHOBRANCHII, the group of Teleostean fishes including the peculiar 'Sea-horses' and the 'Pipe-fishes.' *See* PIPE-FISHES; HIPPOCAMPUS.

LORCA, a town of Murcia, Southern Spain, comprising an old Moorish town on a slope crowned by a castle, and a lower modern town. It is a silver and lead-mining district. The cathedral dates from the twelfth century. Pop. 74,696.

LORD (O.-Eng. *hlâford*, for *hlâfweard*, that is, bread-keeper), a title of honour or dignity, used in different senses. In feudal times a lord was the grantor or proprietor of land, who retained the dominium or ultimate property of the land or fee, the use only being granted to the tenant. A person who has the fee of a manor, and consequently the homage of his tenants, is called the *lord of the manor*. Loosely all who are noble by birth or creation, excepting dukes and princes, may be called *lords*. The *lords temporal*, in contradistinction to the *lords spiritual* (the Archbishops of Canterbury and York, and twenty-four bishops), are the peers who sit together in the House of Lords.

Lord is sometimes only an official title, as *lord advocate*, *lord mayor*, &c. Certain officials, as those of the Treasury and the Admiralty, are collectively called lords in virtue of their office, but are not so addressed personally. The title is also applied, but only by courtesy, to the sons of dukes and marquesses, and to the eldest sons of earls (*see* ADDRESS, FORMS OF). In Scotland the judges of the Court of Session prefix the title 'lord' to their surname, or to some territorial designation assumed by themselves. Judges, when on the bench, are addressed as 'My Lord' throughout the three kingdoms.

LORD'S CRICKET GROUND in London. It is in St. John's Wood, belongs to the M.C.C. (Marylebone Cricket Club) and is regarded as the headquarters of the game. Middlesex home matches are played here; also test and other important matches such as Oxford and Cambridge, and Eton and Harrow. It takes its name from Thomas Lord, who founded it in 1814.

LORDS, HOUSE OF, upper house of the legislature of Great Britain; also the supreme court of law. It arose from the council of barons summoned by the king to advise him on affairs of state. After a time the greater barons separated themselves from the lesser barons and the commons, and with the bishops and abbots became the House of Lords, but the term itself was not used for it until 1544.

To-day the house consists of two classes, the lords temporal and the lords spiritual. The former number some 700 and are divided into five classes, dukes, marquesses, earls, viscounts and barons. The latter consists of the 2 archbishops and 24 bishops. In addition there are a few law lords who are peers for life only.

The basis of membership is heredity. Each member, save only the bishops and the law lords, is the holder of an hereditary title, which carries with it the right to a seat in the House of Lords. Peeresses in their own right are not allowed to sit. The speaker, or chairman of the House, is the lord chancellor and his deputy is the chairman of committees. Its procedure is very like that of the House of Commons. Some members of the Cabinet sit in the House of Lords, but of late years the number of these has decreased.

For a long time the houses, Lords and Commons, were equal in power, but, in the time of Charles II, the power of the Lords over finance was definitely curtailed. In 1911, by the Parliament Act, the House was made subservient to the House of Commons. Now it can only delay, not utterly reject, legislation passed by the Commons. From time to time proposals for reforming the House of Lords, generally by introducing an elective element, have been put forward, but, so far, none has been accepted.

LORD'S PRAYER, a formula of prayer enunciated by Christ on two different occasions, for which see *Matt.* vi, 5–13; *Luke* xi, 1–4. It is known in the older Catholic Churches by its opening words, *Pater Noster*. Among the earliest Christians it was accepted as the standard form of prayer, and its use in the liturgy is frequently mentioned by the early Fathers. The concluding clause of the prayer, known as the doxology, "For Thine is the kingdom," &c., is not found in St. Luke's gospel, and even in that of St. Matthew it is only found in some of the later manuscripts, in which it is generally held to be an interpolation. It is retained by Protestants, but is discarded by Roman Catholics.

LORD'S SUPPER, one of the sacraments of the Christian religion: so med because it was instituted by rist when He took His last meal th His disciples, on the occasion of lebrating the Passover. It has also e names of eucharist and comunion, and among the Catholics at of the Mass or sacrifice of the ass. It has undoubtedly been celeated, with certain differences, since institution, and is still celebrated all sects of Christians except the uakers.

The chief controversies regarding ie nature of the rite rest chiefly on ie question of the 'real presence' of hrist's body and blood and the doine of transubstantiation. The octrine of transubstantiation, proulgated by Paschasius Radbertus in ie ninth century, was generally eceived, and officially approved by ie Council of Rome in 1079. It was olemnly confirmed in 1215 by the ourth Lateran Council. According to his doctrine, the whole substance of he bread and wine is changed into he body and blood of Christ, only the ppearance of bread and wine remaing; and the Roman Catholic Church urther maintains that Christ is given wholly and entirely both under the orm of the bread and under that of he wine.

From the doctrine of transubstanciation sprang the adoration of the ost (or sacred bread), as well as the ustom of refusing the cup in the comunion to the laity and non-officiating priests, a practice first authoritatively sanctioned at the Council of Constance, 1415.

At the Reformation both the German and Swiss reformers agreed in rejecting the doctrine of transubstantiation and the Mass, and maintaining that the Lord's Supper ought to be celebrated before the whole congregation, and with the administration of both bread and wine. In explaining the words by which the supper was instituted Luther and Zuinglius differed, and their different opinions on this subject formed the principal subject of dissension between the Lutheran and Calvinistic Churches.

Luther took the words "This is my body," &c., in their literal sense, and thought that the body and blood of Jesus Christ are united, in a mysterious way, with the bread and wine, which, however, remain unchanged, so that the communicant receives, in, with, and under the bread and wine, the real body and blood of the Redeemer. Zuinglius, on the other side, understood the words in a figurative sense, and maintained that the Lord's Supper was a mere commemoration of the death of Christ, and a profession of belonging to his Church. This view is in substance adopted by the Socinians, Arminians, and some others.

The opinion advanced by Calvin, by which a spiritual presence of the body and blood of Christ is supposed in the communion, by partaking of which the faithful receiver is brought into union with Christ, through the medium of the Holy Ghost, though it came nearer to the Lutheran doctrine than that of Zuinglius did, yet was essentially different. The Greek Church has not adopted the entire doctrine of transubstantiation; yet her doctrine, which was defined and sanctioned by the Synod of Jerusalem in 1672, comes nearer to this dogma than to that of the Reformed Church.

The Anglican Confessions incline more to the view of Zuinglius. The 28th Article of the Church of England declares that "the body of Christ is given, taken, and eaten in the supper only after an heavenly and spiritual manner." The doctrine adopted by the Presbyterian Church of Scotland in the main agrees with that propounded by Calvin.—BIBLIOGRAPHY: R. J. Wilberforce, *Doctrine of the Holy Eucharist*; J. D. Dalgairns, *The Holy Communion: its History, Philosophy, and Practice*; G. A. Jacob, *The Lord's Supper Historically Considered*; R. M. Adamson, *Christian Doctrine of the Lord's Supper.*

LORELEI (lo're-lī), a precipitous cliff on the Rhine, about 450 feet high, half a mile above St. Goar. It is the traditional abode of a siren, who by her singing enticed boatmen to destruction. The legend is a favourite with German poets, and has been treated by Heine. The rock is pierced by a railway tunnel.

LORETO, an interior department and the largest of Peru, in the north-east, fronting the boundaries of Brazil, Colombia, and Ecuador. The exports are rubber, salt, and gold. Area, 163,240 sq. miles; pop. 150,000 (mainly Indians). Iquitos, on the Marañon, is the capital.

LORET'TO, or **LORE'TO,** a city of Ancona, Italy, 3 miles from the Adriatic. Pop. 8,120. The *Casa Santa* or Holy House of Loretto, which is said to have been the house of the Holy Family at Nazareth, and to have been miraculously conveyed by the angels first to Fiume in Dalmatia, and afterwards to Loretto, is an important place of Roman Catholic pilgrimage. This Holy House, in the centre of a church built by Majano and Bramante (1464–1587), and covered externally with white marble, is 30 ft. long, 15 feet wide, and 18 feet high. It was

partially destroyed by fire on 22nd Feb., 1921.

LORIENT, a seaport and arsenal of Morbihan, France, on the Brittany coast. In 1670 the town became a station of the East India Company (French), and was made a naval station on the dissolution of the company in 1771. Its name (*l'Orient*) is derived from this occupation. Lorient is now a prominent naval base with armouries, magazines, and shipbuilding, but has also some trade, especially in coal and sardines. Pop. about 49,039.

LOR'IKEET, the general name of certain small Australian parrots, including the genera Loriculus, Charmosyna, and Coriphilus.

LORIS, the name of two small Oriental lemurs, the slow loris (*Nycticebus tardigradus*), ranging from Assam to the Philippines, and the slender loris (*L. gracilis*), native to Southern India and Ceylon. They are not much larger than rats, and are nocturnal and arboreal in their habits. Many superstitions are associated with the slow loris.

LORNE, district of Argyllshire. It lies between Loch Awe and the sea coast. The Firth of Lorne separates it from the Island of Mull. The eldest son of the Duke of Argyll is called the Marquess of Lorne.

LORRAINE (Ger. *Lothringen*; ancient **LOTHARINGIA**), a territory so named as being the kingdom of Lothaire I (q.v.). Lower Lorraine, between the Rhine, Meuse, and Scheldt, became the Duchy of Brabant, and Upper Lorraine was for long an independent duchy with Nancy as capital. In 1766 it passed to France. At the conclusion of the Franco-Prussian War of 1870–1 a considerable portion of Lorraine was annexed to Germany, but together with Alsace it reverted to France by the Treaty of Versailles, and is now the department of Moselle (*see* ALSACE-LORRAINE). It is rich in coal and iron, and is traversed by the Moselle and Saar. Area, 2,403 sq. miles; pop. (1931), 693,408.—BIBLIOGRAPHY: G. W. Edwards, *Alsace-Lorraine*; R. Putman, *Alsace and Lorraine*; R. Parisot, *Histoire de Lorraine* (vol. i—to 1552).

LORY, a kind of parrot having a broad tail and dense soft plumage, the colours of which are extremely brilliant. Lories are natives of the Australian region. There are several species of the type-genus Lorius, as the purple-capped or collared lory (*Loius domicellus*), cream lory (*L. garrulus*), and scarlet lory (*L. cœruleatus*).

The collared lory is the most highly valued, and is easily taught to speak, having imitative and ventriloq powers of the most remarkable or The general plumage is scarlet, wings green. There are several ot genera, and in South Africa the na lory is given to a plantain ea (*Turacus corythaix*).

LOS ANGELES (lōs an'je-les) city, and capital of Los Ange county, California. It stands on l Angeles River, and is the centre of American cinema industry. It is w served by railways and air servi and is laid out on modern lines w wide thoroughfares and high bui ings in the central part. In the city the University of Southern Californ A huge stadium was erected for t Olympic Games of 1932. Water brought by an aqueduct from t hills 230 miles away and electric lig and power are generated. The ci has a service of electric railways. O of the most beautiful cities of Americ Los Angeles is a favourite healt resort. There is much fruit growing the vicinity, and irriga ion to fost the industry. The manufactures i clude motor vehicles, while oil refinir is another important industry. The are large railway shops and printir works. Los Angeles was settled b the Spaniards as Pueblo de Nuestr Señora la Reina de los Angeles i 1781. Pop. (1930), 1,238,048.

LOSSIEMOUTH, a burgh, seapor and holiday resort in County Moray Scotland. There is a harbour, an fishing is the principal industry. Th burgh consists of three villages, Lossie mouth, Branderburgh, and Stotfield Pop. (1931), 3,914.

LOST PROPERTY. If any perso finds an article, it does not belong t him but to the loser, and if the lose can identify his property, he has a right to restitution; a third party purchasing lost property from the finder must restore it to the owner if called upon. The finder is not obliged to incur expense in advertising for the owner. The act of taking lost property to a local police office, and of obtaining a receipt therefor, entitles the finder to absolute power of disposal over such property when a reasonable time has been allowed for its recovery.

LOST TRIBES, THE. The return of the tribes of Judah carried captive into Babylon in 527 B.C. is recorded in sacred history; but concerning the ultimate fate of the tribes expatriated by Tiglath-pileser in the time of the Jewish king Pekah (2 *Kings* xv, 29), and of those exiled after the later fall of Samaria (2 *Kings* xvii, 6), who were carried into Assyria, history is silent, and the fate of these 'lost tribes' and the identity of their descendants has long been a matter of

curious and, for the most part, extremely fanciful speculation.

The Anglo-Israelite theory, which would identify the missing tribes with the Anglo-Saxon race, has found many supporters, but possesses little or no solid grounds for serious consideration. Other inquirers claim to have discovered the 'lost tribes' in the North American Indians, in the Laplanders, or in the primitive inhabitants of Mexico, this last theory finding an enthusiastic partisan in Lord Kingsborough. William Whiston was inclined to view with favour the belief which traced the Tartars to a Jewish source.

Perhaps the least improbable theory is that by which the missing tribes have been identified with the Afghans, a people presenting many interesting points of likeness to the Jewish race; but the surmise is, in spite of something to support it, one to be regarded with caution. There is a fairly extensive literature which treats of the subject of the missing tribes.

LOT (lot), an inland department of South-West France; area, 2,017 sq. miles. It is traversed by the Dordogne in the north, but lies mainly in the valley of the Lot, one of the largest tributaries of the Garonne. It has a course of some 250 miles. In the department there are extensive vineyards, and the soil, &c., makes it suitable for dairying and stock-breeding. The capital is Cahors (q.v.). Pop. (1926), 171,776.

LOT-ET-GARONNE (lot-e-gá-ron), an inland department of South-West France; area, 2,078 sq. miles. It is intersected by the Garonne and its tributary the Lot. In the valleys there are many vineyards; throughout the province cereals are raised, with some tobacco and hemp. The department comprises parts of pre-Revolutionary Guienne and Gascony. The capital is Agen (q.v.). Pop. (1931), 247,500.

LOTHAIRE I, Emperor of the Holy Roman Empire, born A.D. 795, died 855. He gave his name to Lorraine (Lotharingia).

LOTHAIRE II, called *the Saxon*, Emperor of the Holy Roman Empire (q.v.), born about 1060, died 1137.—Cf. Viscount Bryce, *Holy Roman Empire*.

LOTHIAN, MARQUESS OF, Scottish title borne by the family of Kerr. In 1606 Mark Kerr, a lord of session, was made Earl of Lothian. Robert, the 4th earl, was made a marquess and from him the present marquess is descended. Philip Henry Kerr, the 11th marquess, was born, 18th April, 1882, and educated at the Oratory School, Birmingham, and at New College, Oxford. He was editor of *The Round Table*, 1910–16, and secretary to D. Lloyd George, 1916–21. In 1930 he succeeded a kinsman in the title. In Aug., 1931, he was made Chancellor of the Duchy of Lancaster in the National Government, but he only held office for a few weeks. He went to India as chairman of one of the committees appointed to deal with matters concerning the future government of that country. His seats are Newbattle Abbey, near Edinburgh, and Blickling Hall, Norfolk. The fine library at Blickling was sold in 1931.

LOTI, Pierre, pen-name of **Louis Marie Julien Viaud,** French novelist and naval officer, born at Rochefort 14th Jan., 1850. He entered the marine service in 1867, served with distinction throughout the Tongking campaign, and retired from the navy in 1898 with the rank of lieutenant.

Loti's works are a revival of the spirit of romanticism in French literature, and thus the very antithesis of those of the realistic school. Full of intense passion but also of universal pity and resignation, they arouse a feeling of melancholy in the reader.

The impression one receives in reading Loti's novels is that the author, despising all excess of culture, is invariably attracted by the primitive, either in character, race, or civilization. Landscape always plays an important part in Loti's novels, and his description is so vivid that the country where his scene is laid always assumes an individuality of its own.

His first novel *Aziyadé* appeared in 1876. *Rarahu*, a Polynesian idyl, afterwards re-published as *Le Mariage de Loti*, appeared in 1880. Other works from his pen include: *Le Roman d'un Spahi* (1881), *Mon Frère Yves* (1883), *Pêcheur d'Islande* (1886), *Madame Chrysanthème* (1887), *Le Désert* (1895), *Ramuntcho* (1897), *La Galilée* (1898), *L'Inde (sans les Anglais* (1903), *Les Désenchantées* (1906), and *La Mort de Philæ* (1908). He was elected to the Académie Française in 1891. He died in 1923.—Cf. H. Bordeaux, *Quelques Portraits d'Hommes*.

LOTOPH'AGI (Gr. *lotos*, lotus, and *phagein*, to eat), or lotus-eaters, in Greek mythology, the name of a people inhabiting a portion of Cyrenaica in Northern Africa, who lived on the fruit of the lotus tree. According to Homer, they received Odysseus and his followers hospitably, but the sweetness of the fruit (lotus) induced such a feeling of happy languor that they ceased to desire to return to their native land. *See* LOTUS.

LOTTERY, a scheme for the distribution of prizes by chance, the plan being generally to have a certain number of prizes and a much greater number of tickets, the prizes being allotted according as the drawing of numbered tickets from a suitable receptacle shall decide. Lotteries on a large scale originated in Italy, from which they passed into France.

In England the first public lottery occurred in 1569, the proceeds being devoted to public works. The rage for private, and, in many instances, most fraudulent lotteries, was at its height in England in 1709, and towards the close of the year an existing Act of Parliament was enforced for the suppression of such lotteries as

Lotus (*Nymphæa Lotus*)

public nuisances. Government lotteries still continued, however; but in 1826 lotteries were abolished in Britain, except in the case of art-unions, which are permitted from their supposed good effects in encouraging art.

In France the demoralizing influence of lotteries caused their suppression in 1836. They are still exceptionally permitted, and State Lottery Bonds are issued, prizes being awarded to those whose Bond numbers are drawn at stated periods. Lotteries for merchandise of all kinds, from estates to pictures, are common in Germany; and in Italy and Austria the Governments draw an important part of the revenue from their management of money lotteries. In most of the United States lotteries, formerly very commonly resorted to as a means of assisting colleges or benevolent institutions, have been abolished, or at least require a special authorization from the legislature. Sweepstakes on a large scale have recently been organized by the Irish Free State. A proportion of the money subscribed is earmarked for Irish hospitals, and the sums yielded have been substantial. In the 1932 Derby Sweepstake the total sum subscribed was £4,184,485, the prize money was £2,804,552, and the hospitals received £516,060.

In Britain sweepstakes and raffles are lotteries. So are 'missing-word' competitions, where there are several equally suitable solutions, and such-like competitions in which money is risked or gained by chance. Even an agreement to share the profits of an adventure by lot constitutes a lottery; but it is not illegal for benefits in a mutual benefit society to be allotted to the members in turn by periodical drawings.—Cf. J. Ashton, *History of English Lotteries.*

LOTUS or **LOTOS,** a name applied to a number of different plants, from the lotus famous in Greek legend. One of these is the *Zizyphus Lotus,* a native of Northern Africa and Southern Europe, belonging to the nat. ord. Rhamnaceæ. It is a shrub 2 or 3 feet high, bearing a fruit, the jujube, which is a drupe of the size of a wild plum. Some think this was the food of the Lotophagi, though others consider Homer's lotus to have been the date, or the berry of the *Rhamnus Lotus,* or that of the *Nitraria tridentata,* still greatly prized by the Berbers.

The name lotus was also given to several species of water-lily, as the blue water-lily (*Nymphæa cærulĕa*), the Egyptian water-lily (*N. Lotus*), and to the nelumbo (*Nelumbium speciōsum*), which grow in stagnant or slowly running waters. *Nymphæa cærulĕa* and *N. Lotus* are often found figured on Egyptian buildings, columns, &c., and the nelumbo, or Hindu and Chinese lotus, plays a prominent part in the mythology of these countries. The Hindu deities are often represented seated on a throne of the expanded lotus flower. Among the Chinese the lotus was connected with Fuh, or Buddha, and symbolized female beauty.

The name is also given to a genus of plants, nat. ord, Leguminosæ, consisting of creeping herbs and undershrubs, chiefly natives of temperate regions throughout the world. Four or five species are found in Britain, where they are known as bird's-foot trefoil.

LOTUS-EATERS. *See* LOTOPHAGI.

LOUBET, Émile, French statesman, seventh President of the French Republic, born at Marsanne, department of Drôme, on 31st Dec., 1838. He studied law in Paris, and in 1876 entered the Chamber of Deputies,

where he joined the Radical Left, or the Radical Republican group. He was Minister of Public Works in 1887, and in 1892 became Premier in succession to M. de Freycinet. President of the Senate in 1896, and again in 1898, he succeeded Felix Fauré as President of the Republic in Feb., 1899.

He was a man of strong democratic tendencies, and during his tenure of office a strong anti-clerical policy was inaugurated, culminating in the separation of Church and State in 1905. He was strongly in favour of a revision of the Dreyfus case. He died in 1929.

LOUD SPEAKER, apparatus for converting the electric energy in a wireless or wired telephone receiver into generally audible sound vibrations. Two main types are made, the cone type being a megaphone attachment to a telephone, the moving-coil type having permanent magnets between which the coil carrying the current moves. Loud speakers are used in broadcast reception and generally for announcements in public.

LOUGHBOROUGH, a municipal borough and town of Leicestershire, on the Soar, with large engineering works, hosiery manufactures, a bell-foundry, and dye-works. There is a college with departments of science, art, and engineering. The war memorial is a bell tower in Queen's Park with a fine carillon. Pop. (1931), 26,945.

LOUGHTON, urban district of Essex. It is 11¼ miles from London, on the L.N.E. Rly. In former times the inhabitants had the right to cut firewood in Epping Forest, which adjoins the town, and the Lopping Hall, built in 1883, is a reminder of this practice. **Loughton Hall** stands on the site of a famous Tudor mansion. Pop. (1931), 7,390.

LOUIS (Ger. *Ludwig*; q.v.), the name of eighteen kings of France descended from Louis I, King of the Franks and also German king. *See* FRANCE; GERMANY; LUDWIG; HOLY ROMAN EMPIRE.—BIBLIOGRAPHY: J. de Joinville, *Saint Louis*; C. Hare, *Life of Louis XI*; Sir Walter Scott, *Quentin Durward*; A. Dumas (père), *Mes Mémoires* (vol. i), *Taking the Bastille, Comtesse de Charny*; A. C. S. Haggard, *Louis XVI and Marie Antoinette*; F. G. Lenôtre, *The Riddle of the Temple Prison* (Louis XVII); M. F. Sandars, *Louis XVIII.*

Reigned.	Born.	Died.		Succeeded by.
Louis I (814–840) ..	778	840	Third son of Charlemagne	Lothaire I.
Louis II (877–879) ..	846	879	Son of Charles the Bald	Louis *the Blind.*
Louis III (879–882) ..	863	882	,, Louis II	Charles III.
Louis IV (936–954) ..	921	954	,, Charles III	Lothaire II.
Louis V (986–987) ..	966	987	,, Lothaire	Hugh Capet.
Louis VI (1108–1137)	1078	1137	,, Philip I	Louis VII.
Louis VII (1137–1180)	1120	1180	,, Louis VI	Philip Augustus.
Louis VIII (1223–1226)	1187	1226	,, Philip Augustus	*Saint* Louis.
Louis IX (1226–1270)	1214	1270	,, Louis VIII	Philip III.
Louis X (1314–1316) ..	1289	1316	,, Philip IV	John I.
Louis XI (1461–1483)	1423	1483	,, Charles VII	Charles VIII.
Louis XII (1498–1515)	1462	1515	,, Charles, duc d'Orléans, grandson of Charles V	Francis I.
Louis XIII (1610–1643)	1601	1643	,, Henry IV	Louis *the Great.*
Louis XIV (1643–1715)	1638	1715	,, Louis XIII	Louis XV.
Louis XV (1715–1774)	1710	1774	Great-grandson of Louis XIV	Louis XVI.
Louis XVI (1774–1793)	1754	1793	Grandson of Louis XV (guillotined)	
Louis XVII	1785	1795	Second son of Louis XVI (titular king, 1793–5)	
Louis XVIII (1814–1824)	1755	1824	Grandson of Louis XV; brother of Louis XVI	Charles X.

LOUIS, *the German*, born about A.D. 800, died 876, youngest son of Louis I, grandson of Charlemagne. He divided with Charles the Bald the dominions of Lothaire I, their nephew.

LOUISBURG, a seaport of Cape Breton, Nova Scotia, Canada. It was strongly fortified under the French; but was taken by the British in 1745 and by Boscawen and General Amherst in 1758, the island being ceded to them in 1763. There is a fine harbour and important fisheries. Pop. 1,152.

LOUIS D'OR (lō-ē dor), or simply **LOUIS,** a gold coin of France, first struck in 1640 by Louis XIII, in circulation until 1810. The inscription,

Christus regnat, vincit, imperat, was superseded in 1792 by *Règne de la loi*. It ranged in value from about 16*s*. 7*d*. to 18*s*. 9¼*d*. sterling. In 1810 the louis d'or was replaced by the napoleon of 20 francs, or 15*s*. 10*d*. sterling, and when the coin was again struck under the Restoration the same value (20 francs) was retained.

LOUISIADE ARCHIPELAGO, an island group of Oceania, in the Australian Commonwealth territory of Papua (formerly British New Guinea). It was discovered by Torres (1606), and annexed to Britain in 1888, subsequently passing to Australia (1901). The inhabitants are of Melanesian and Papuan extraction, and the majority are of peaceful habits. Alluvial gold is found.

LOUISIANA (lō-iz-i-an'a), one of the Southern United States of America, on the shores of the Gulf of Mexico. It has an area of 48,506 sq. miles. The coast, extending for 1,250 miles, is a low swampy region lying around the Mississippi delta, but producing large quantities of rice and sugar-cane; towards the north and north-west the highest elevation is reached.

Physical. The chief rivers are the Mississippi, which runs for about 600 miles along the border of and through the state; the Red River, which crosses the state diagonally and forms an important inland water-way; the Washita, Sabine, and Pearl, all navigable. There are also numerous 'bayous' or secondary outlets of the rivers of much importance for both navigation and drainage purposes. The climate is semi-tropical, and the rainfall heavy along the coast.

Production and Industry. The leading industry is agriculture, the main crops being corn, rice, and cotton, with some oats, potatoes, and tobacco. Dairying is also practised to a limited extent, and there is extensive lumbering. There are sulphur-mines and salt deposits; valuable fisheries and oyster beds extend along the coast.

Communications. The Mississippi and other rivers afford exceptional inland waterways; the railways are extensive (4,639 miles), mainly on the lines of the Illinois Central, Louisville and Nashville, Texas and Pacific, and Southern Pacific systems. There is also a limited mileage (316 miles) of electric track, and 4,194 miles of navigable waterways.

Towns, &c. Baton Rouge is the state capital, and contains the state university (founded 1860), and the Agricultural and Mechanical College (opened 1874). New Orleans is by far the largest town, and is the state seaport. It contains the Roman Catholic University of Loyola, founded 1904. The New Orleans University (founded 1847) is for coloured persons. About 56 per cent of the population of Louisiana are of the Roman Catholic faith.

History. Louisiana was annexed to France by La Salle in 1682. He named it after Louis XIV, and the district was colonized by the French in 1699. In 1717 it was ceded to a chartered company promoted by the notorious Law; resumed in 1720 by the Crown; ceded to Spain (1763); and re-ceded to France again in 1800. In 1803 the United States purchased Louisiana from France, and it was admitted into the Union in 1812. Pop. (1930), 2,101,593 (776,326 being negroes).—Cf. A. Phelps, *Louisiana* (in American Commonwealth Series).

LOUIS PHILIPPE, King of the French, born at Paris, 1773, died at Claremont, England, 1850. He was the eldest son of Philippe Egalité (*see* ORLEANS), and during his father's lifetime he was known as duc de Chartres. His education was entrusted to Madame de Genlis. In 1791 he entered the Revolutionary army, and took part in the battles of Valmy and Jemappes; was present at the bombardment of Venloo and Maestricht, and distinguished himself at Neerwinden.

Dumouriez had formed a scheme for placing him on the throne as a constitutional monarch, and, being included in the order of arrest directed against Dumouriez in 1793, he took refuge within Austrian territory. For twenty-one years he remained exiled from France, living in various European countries, and in America. He had become duc d'Orléans on the execution of his father in 1793, and in 1809 he married the daughter of Ferdinand IV of Naples. After the fall of Napoleon I he returned to France, and was reinstated in his rank and property.

At the Revolution of July, 1830, and the abdication of Charles X, he was made 'lieutenant-general of the kingdom,' and in August became constitutional king of the French. He reigned for eighteen years (*see* FRANCE), when the Revolution of Feb., 1848, drove him from the throne to exile in England. — BIBLIOGRAPHY: L. G. Michaud, *Public and Private Life of Louis Philippe*; *Cambridge Modern History* (vol. x); F. A. Gruyer, *La Jeunesse du roi Louis Philippe*.

LOUIS-QUATORZE STYLE (lō-ē-kà-torz), a style of architecture and internal ornamentation prevalent in France in the reign of Louis XIV. Externally the forms are classical, freely treated, and rustication is much employed; the windows are larger and

he rooms more lofty and spacious han in buildings of the preceding ›eriod, and there is generally an effort ıt sumptuous elegance. The Palace of Versailles and the east front of the Louvre are prominent examples of his style. The most characteristic features of the Louis-Quatorze style, however, are seen in the internal ornamental decoration, the great medium of which was gilt stucco-work, and its most striking characteristics are an infinite play of light and shade, and a certain disregard of symmetry of parts and of symmetrical arrangement. The characteristic details are the scroll and shell. The classical ornaments, and all the elements of the Cinquecento, from which the Louis-Quatorze proceeded, are admitted under peculiar treatment, or as accessories; the panels are formed by chains or scrolls, the concave and convex alternately; some clothed with an acanthus foliation, others plain.

Louis-Quinze (lö-ē-kanz) is given to the variety of style which prevailed in France during the reign of Louis XV. In it the want of symmetry in the details, and of symmetrical arrangement, which characterize the Louis XIV style, are carried to an extreme. It is crowded with meaningless parts devoid of beauty and expression. The four varieties of French furniture are referred to under FURNITURE.

LOUISVILLE, a city of Jefferson county, Kentucky, United States, sometimes called **Falls City** from the rapids of the Ohio River (descending 26 feet in 2 miles), above which the city stands. It is the largest city of the state, with a river frontage of 7 miles, and connected by bridges with New Albany and Jeffersonville, on the opposite bank of the river, and in the state of Indiana.

A canal 2¼ miles long carries the river traffic round the rapids. Louisville is a great railway junction and a great centre of trade. There is a university. The city was founded in 1778, and named in honour of Louis XVI of France. It was chartered as a city in 1828. Pop. (1930), 307,745.

LOURDES (lörd), a town of Hautes-Pyrénées, France, and one of the chief places of Roman Catholic pilgrimage in Europe. In 1858 a peasant maiden (Bernadette Soubirous) declared that she had been favoured with visions of the Virgin Mary, in the grotto where now stands the shrine devoted to *Our Lady of Lourdes*. Pop. 14,154.

LOURENÇO MARQUES, a seaport of Portuguese East Africa, on Delagoa Bay (q.v.). The capital of Mozambique, it is the nearest outlet for the produce of the Transvaal. There is a large harbour and extensive docks. The city has a botanic garden. Pop. 20,000 (7,000 white).

LOUSE, the common name of about forty species of small wingless insects, parasitic on man and other mammals. There is a simple eye or ocellus, on each side of a distinctly differentiated head, the under surface of which bears a suctorial mouth. There is little distinction between the thorax and abdomen, but the segments of the former carry three pairs of legs. The legs are short, with short claws or with two opposing hooks, affording a very firm hold. The body is flattened and nearly transparent, composed of eleven or twelve distinct segments.

Panel in Louis-Quartorze Style

LOUSEWORT (Pedicularis), a large genus of Scrophulariaceæ, half-parasitic herbs with their roots attached to those of other plants. Two pink-flowered species, *P. palustris* and *P. sylvatica*, are British. Many handsome kinds are found on the Alps and other high mountains. The belief that these plants induce lousiness in sheep is without foundation.

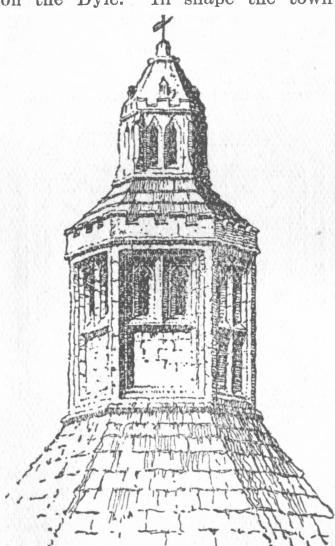
LOUTH, a municipal borough of Lincolnshire, England, on the Lud, and connected with the Humber by a canal constructed in 1763. Brewing is carried on, and agricultural implements are manufactured. The church of St. Peter dates from the twelfth century, and there are traces of a twelfth-century Cistercian abbey. Pop. (1931), 9,678.

LOUTH, the smallest county of the Irish Free State, in Leinster; area, 208,814 acres, exclusive of water. In its coast-line are Carlingford Lough, Dundalk Bay, and the estuary of the Boyne. Agriculture is the main industry, but fishing is important; linen is manufactured. Drogheda and Dun-

dalk (the county town) are the principal towns.

The county is named after Louth, a village within its boundaries, originally known as Knockfergus. As a county Louth existed from the thirteenth to the fourteenth century as a part of Ulster, and was before that time a fief of Argial. Pop. (1926), 62,739.

LOUVAIN (lö-van; Fl. *Leuven*; Ger. *Löwen*), a town of Brabant, Belgium, on the Dyle. In shape the town



Louvre, Glastonbury Abbey

resembles a circle, the circumference being formed by old ramparts, now partially converted into promenades. In the fourteenth century the town was a centre of the cloth trade, but was taken by Duke Wenceslas in 1382, and most of the tradesmen emigrated to escape his persecutions.

The university, founded in 1423 by Duke John IV of Brabant, was regarded as one of the most famous in Europe in the sixteenth century, having 6,000 students and (1547–1606) 43 colleges. It was closed by the French Republicans, but revived by the Dutch Government in 1817. The Hôtel de Ville was erected between 1447 and 1463, and houses some notable pictures. The church of St. Michael was erected for the Jesuits (1650–66). Outside the town is the Abbaye de Parc, a Norbertinian house founded in 1129, dissolved during the Revolution, but revived in 1836.

During the European War Louvain was early occupied by the Germans (19th Aug., 1914); the town was sacked (27th Aug., 1914). The university library, with its magnificent collection of books and MSS., was burnt by German troops, but thousands of books were sent out from England in 1921, to replace those destroyed, and an American rebuilding scheme was approved by the Belgian Government. The new building was opened in 1928. Pop. (1931), 38,734.

LOUVIERS, a town of the department of the Eure, France. It has a church dating from the twelfth century; there are traces of a Cistercian abbey. Pop. 10,320.

LOUVRE (lö'vèr), in architecture, a dome-turret rising from the roof of a hall or other apartment, formerly open at the sides, but now generally glazed. Louvres were originally intended to allow the smoke to escape when the fire was kindled in the middle of the room. *Louvre window* is the name given to a window in a church tower, partially closed by slabs or sloping boards or bars called *louvre boards* (corrupted into *luffer* or *lever boards*), which are placed across to exclude the rain, while allowing the sound of the bell to pass.

LOUVRE. *See* PARIS.

LOV'AGE, a herbaceous perennial umbelliferous plant, genus Ligusticum, widely distributed throughout temperate regions. *L. officinale*, common lovage, is sometimes used as an aromatic stimulant. *L. scoticum*, found on the sea-coasts of Scotland, is occasionally used as a pot-herb.

LOV'AT, Simon Fraser, Lord, second son of Thomas Fraser of Beaufort, afterwards twelfth Lord Lovat, born 1667, beheaded at Tower Hill, London, 1747. In 1699, on the death of his father, he assumed the title of Lord Lovat, to which on the death of the eleventh Lord Lovat his father had acquired a disputed claim. He effected a forced marriage with the Dowager Lady Lovat, for which he was outlawed and forced to take refuge in France.

After a varied life of intriguing, first on the Hanoverian side and next on the Stuart, and a long imprisonment, claim to his title, which had been objected to in various elections, was finally allowed by the Court of Session in 1730. On the outbreak of the Rebellion of 1745 Lovat acted with his usual duplicity, joined Prince Charles Edward, was captured after

Culloden, and executed.—BIBLIOGRAPHY: Sir Walter Scott, *Tales of a Grandfather*; W. C. Mackenzie, *Simon Fraser, Lord Lovat: his Life and Times*.

LOVE-BIRD, a name given to two genera of diminutive birds (Agapornis and Psittacula) of the parrot family. The former genus belongs to the Ethiopian region, and the latter to tropical America. They receive their name from the great attachment shown to each other by the male and female birds. Swindern's love-bird is barely 6 inches in length.

LOVELACE, Richard, English poet, was born in 1618, and died in 1658. He was educated at the Charterhouse and at Gloucester Hall, Oxford. Entering the army, he became a captain in 1639. He was an ardent Royalist, and in 1642 was imprisoned for presenting the Kentish Petition to Parliament.

In 1646 he raised a regiment for the service of the French king, France being then at war with Spain, and commanded it in person. He was imprisoned again in 1648; in 1649 he published his principal collection of lyrics, called *Lucasta*. His poetry enjoys a reputation entirely out of proportion to its bulk, owing to his two poems *To Althea from Prison* and *To Lucasta, on going to the Wars*.

LOVER, Samuel, Irish novelist and song-writer, born in 1797, and died in 1868. Among his works are: *Legends and Stories of Ireland* (1832–4); *Rory O'More*, a novel (1837); *Songs and Ballads* (1839); *Handy Andy*, a novel (1842); and *Treasure Trove*, a novel (1844). *The Angel's Whisper, Molly Bawn*, and the *Low-backed Car* are among his most popular songs.—Cf. B. Bernard, *Life of Samuel Lover*.

LOW ARCHIPELAGO, an atoll group of Oceania (q.v.) known as the Paumotu and Tuamotu. They are mostly French possessions.

LOWE (lō), **Sir Hudson,** lieutenant-general, born at Galway 1769, died 1844. In 1813 he was attached to the army of Blücher. On the fall of Napoleon he was appointed Governor of St. Helena, but incurred the aversion of Napoleon, and many charges of undue severity were brought against him which were subsequently refuted. Sir Hudson was allowed to die in poverty. His *Letters and Journals* were published in 1852.—BIBLIOGRAPHY: R. C. Seaton, *Sir Hudson Lowe and Napoleon*; Sir W. Scott, *Life of Napoleon Buonaparte* (vol. ix).

LOWELL, a city of Massachusetts, United States, at the confluence of the Concord and Merrimac Rivers. It is a leading industrial centre, with huge mills and factories operated by the power harnessed from Pawtucket Falls (32 feet drop) on the Merrimac. It is an important railway centre. Founded in 1822, it became a city in 1836. Pop. (1930), 100,234.

LOWESTOFT, a seaport, municipal borough, and watering-place of Suffolk, England. The harbour is partly formed by two piers (1,300 feet long), and there is an esplanade. The fisheries are important. The fourteenth-century church of St. Margaret and the parks are prominent features. Railway connections are provided by the L.N.E. Railway.

Swindern's Love-bird (*Psittacula Swinderniana*)

During the European War Lowestoft was a naval base, and was bombarded by four German cruisers, assisted by Zeppelins and destroyers, and supported by the German battle-fleet (25th April, 1916). The bombardment lasted for twenty minutes. Another sea-raid was made in Nov., 1916, and air-craft attacks were frequent. Pop. (1931), 41,768.

LOW-TEMPERATURE CARBONIZATION, the distillation of coal at a comparatively low temperature. In ordinary gas-works practice coal is distilled at a temperature of about 1,000 ° C. to 1,200° C., compared with 500° C. to 600° C. in the low-temperature processes. The temperature of distillation determines the nature of the products, gaseous and residual, obtained from a given coal.

At high temperatures the more volatile hydro-carbons in the coal are removed much more completely, with the result that the residual fuel ('coke') is practically devoid of volatile matter. Very large volumes of gas are also formed. At low temperatures the residual solid fuel (coalite, smokeless fuel, and other trade names) contains about 10 per cent. of volatile matter,

while a greater proportion of light oils, motor-spirit, &c., is formed, and much less gas.

Coal—Britain's most important raw material—is an exceedingly complex mixture of substances, many of which are valuable for chemical purposes, and most of which are combustible. The nitrogen in coal can be recovered as ammonium sulphate, and the nitrogen in fuel is practically Britain's only native source of fixed nitrogen.

Large quantities of motor-spirit are imported annually, and the Navy depends more and more on supplies of oil-fuel for its motive power. Both these substances can be obtained by distilling coal. It therefore becomes a question of national importance to ascertain whether it is more advantageous to burn raw coal, or to treat it by distilling it first at a low temperature.

Will the value of the distillation and residual products of 1 ton of distilled coal be sufficiently in excess of the value of 1 ton of raw coal to justify the additional labour and capital costs introduced? No satisfactory answer has yet been found. At present it is doubtful whether there is a satisfactory process of low-temperature distillation—quite apart from economic and national considerations. The greatest technical difficulty arises from the swelling of the coal. The swollen coal forms a kind of 'pudding' which chokes the retorts.

To prevent this the coals used must be suitably blended and the heating must be carried on very carefully, and special means must be taken to get the heat applied to the coal throughout its entire body. The systems which have depended upon heating a mass of coal from the outside have all failed owing to this difficulty, and various methods have been adopted to overcome this.

In the Del Monte process small coal is fed into the bottom end of an inclined tube about 12 inches in diameter, which is externally heated by gas. The inclined tube slopes at an angle of about 15° to the ground, and has in the centre of it a hollow tube having on the outside an Archimedean spiral blade. Hot gases pass up the centre of this inner shaft, and the outside of the cylinder is also heated. As the shaft rotates, the blades are supposed to drive the coal along. When the coal comes out, it falls into conveyors which remove it. These retorts are very simple mechanically, and the principle is an attractive one, but unfortunately a highly bituminous coal tends to stick, and if sticking takes place, the coal inside the retort will clog up and get wedged in between the blades of the spiral, and the congealed mass will turn round as a solid whole, thus putting the plant out of action.

The Tarless Fuel Company of Battersea has a vertical retort which tapers from the bottom to the top and is heated by gas. The inside of the retort has large cast-iron fins cast on it, so that the body of the retort is divided into four or five more or less parallel regions of small section. The inside of the retort is kept under a suction of some 18 to 20 inches of vacuum. The purpose of this is to give the coal a better chance of giving up its 'volatiles' at a low temperature.

With ordinary bituminous coal the 'yield' per ton of coal would be approximately as follows: L.T. coke, 14·5 cwt.; pitch, 120 lb.; fuel oil, 13 gall.; light oils and spirit, 7·5 gall.; ammonium sulphate, 6 lb.; gas, 3,800 c. feet. With a cannel or other highly bituminous coal the proportions of fuel oil and light oils would be greater, and that of solid fuel less. *See* COAL; COAL-TAR.—BIBLIOGRAPHY: W. A. Bone, *Coal and its Scientific Uses*; A. H. Sexton and W. B. Davidson, *Fuel and Refractory Materials*.

LOWTHER, village of Westmorland. It is 4 miles from Penrith and gives its name to the family of which the Earl of Lonsdale is the head. Here is the earl's seat, **Lowther Castle,** built in the style of the 14th century and containing some valuable treasures.

LOWTHER HILLS (lou'*th*ĕr), a range of Scottish hills extending across the South of Lanarkshire and north of Dumfriesshire to the southern borders of Peebles and Selkirk shires. Highest summits, Green Lowther (2,403 feet) and Lowther Hill (2,377 feet).

LOYO'LA, Ignatius, original name **Inigo Lopez de Recalde,** the founder of the Jesuits (q.v.), born at the castle of Loyola, Guipuzcoa, 1491, died in Rome 1556. He was a page at the court of Ferdinand and Isabella, but entered the army, and during the defence of Pampeluna against the French (1521) he was severely wounded, and a long and tedious confinement was the result. The only books he found to relieve its tedium were books of devotion and the lives of saints. This course of reading induced a fit of passionate devotion and repentance in which he renounced the world, made a formal visit to the shrine of the Virgin at Montserrat, and vowed himself her knight (1522).

After his dedication he made a pilgrimage to Rome and Jerusalem, and from 1524 to 1527 attended the schools and universities of Barcelona, Alcala, and Salamanca. In 1528 he went to Paris for general and theological training.

Here in 1534 he formed the nucleus of the Society of Jesus, François Xavier, professor of philosophy, Laynez, and others having sworn in conjunction with Loyola to devote themselves to the care of the Church and the conversion of infidels. Rome ultimately became their head-quarters, when Loyola submitted the plans of his new order to Paul III, who, under certain limitations, confirmed it in 1540. (*See* JESUITS.) Loyola continued to reside in Rome and govern the society he had constituted till his death. He was beatified in 1607 by Paul V, and canonized in 1622 by Gregory XV.—BIBLIOGRAPHY: F. Thompson, *Saint Ignatius Loyola*; H. Joli, *St. Ignace de Loyola*; J. J. Campbell, *The Jesuits* (1534–1921); see also *Letters and Instructions of St. Ignatius Loyola*, translated by D. F. O'Leary.

LOZÈRE (lo-zâr), a department of Southern France, comprising parts of pre-Revolutionary Languedoc and Gévaudan; area, 1,996 sq. miles. The department is generally mountainous (Cévennes), Mount Lozère rising to 4,884 feet. The general character of the department is pastoral, live-stock being largely raised and cheese-making practised to some extent. The Rivers Allier, Lot, and Tarn rise within the department, which belongs to the basins of the Loire, the Rhône, and the Garonne. The capital is Mende. Pop. (1931), 101,841.

LUBAO, a town of Pampanga, Luzon, Philippine Islands, 30 miles from Manila by rail, with a large trade in indigo, rice, and sugar. Pop. about 21,175.

LUBBOCK, Sir John, English politician and naturalist, born in London 1834, died 1913, joined his father's banking business in 1848; partner in 1856; entered Parliament in 1870 for Maidstone; and represented London University from 1880 till 1900, when he was raised to the peerage as Baron Avebury. He was an authority on finance and education, and his name was associated with several important public measures, such as the Bank Holiday and Ancient Monuments Acts. His works include: *Prehistoric Times*; *Origin of Civilization*; *Origin and Metamorphoses of Insects*; *British Wild Flowers in their Relation to Insects*; *Ants, Bees, and Wasps*; *Flowers, Fruits, and Leaves*; and *The Pleasures of Life*.

LÜBECK, a free city and state of Germany, and a constituent of the German Reich, 12 miles from the Gulf of Lübeck, on the Baltic; area, 115 sq. miles. The city is the capital of the state, and was formerly surrounded by walls, of which four striking fifteenth-century gates survive. It was founded by Count Adolphus II of Holstein (1143), ceded to Saxony (1158), and in Danish occupation in 1201. In 1226 Lübeck became a free imperial city, and (1241) the leader of the Hanseatic League (*see* HANSE TOWNS).

France annexed the city in 1810, but renounced all rights after the battle of Leipzig (1813), and Lübeck eventually joined the North German Confederation (1866), becoming a state of the empire in 1870. It is now a republic by Constitution dated 23rd May, 1920, and is governed by a House of Burgesses (80 members), which elects a Senate (12 members).

Lübeck Cathedral was founded by Henry the Lion in 1173, and was completed in the fourteenth century. A channel connects Lübeck with the Baltic, but Travemünde (in the state) is the port. Lübeck is a railway junction, and has an extensive trade in timber and wine. Pop. (state, 1925), 127,971; (town, 1925), 120,788.—Cf. W. King, *Three Free Cities*.

LUBITSCH, Ernst, German actor. He was born in Berlin, 29th Jan., 1892, and from 1911 to 1922 gained experience as an actor in Germany. In 1922 he went to America to direct Mary Pickford's work for the films, and since 1927 he has produced for the Famous Players-Lasky Corporation.

LUBLIN, a town and capital of the government of Lublin, Poland, on the Bistrzyca, with a thirteenth-century cathedral and the ancient palace of John Sobieski. In 1702 Lublin was sacked by Charles XII of Sweden. During the European War it was captured by the Germans (July, 1915). Pop. (1931), 112,522.

LUBRICANTS, substances employed to reduce friction between surfaces subjected to loads and moving relative to each other. The lubricant is introduced between the moving parts and holds them apart. When two solid bodies are rubbed together, there is a measurable resistance to the movement, no matter how carefully they have been machined and polished to ensure smoothness. This is caused by the abrasive action of microscopic ridges and projections.

Where friction between solids can be reduced to fluid friction by the use of a lubricant, the efficiency of the machine is increased, while the temperature of the working parts and the wear and tear are reduced. Among the substances employed are: *solids*, plumbago, graphite, and soapstone; *semi-solids*, greases, consisting of

animal and vegetable oils emulsified with soap and water, or mineral oils thickened with soap; *liquids*, animal, vegetable, and mineral oils, singly or in combination.

The characteristics of a lubricant—viscosity, oiliness, body, degree of freedom from corroding acids and from liability to oxidize to gummy and sticky substances, and temperature actions—are found to vary from substance to substance.

LUCAN (Marcus Annæus Lucanus), Roman poet of the Silver Age, was born in A.D. 39, and died in A.D. 65. He was a grandson of Seneca the rhetorician, and a nephew of Seneca the philosopher. Lucan's father was a very wealthy man, and the poet received the best education procurable.

The aim of Roman education at that time was to make a man eloquent, and Lucan proved only too apt a pupil. He astonished everyone by his precocity, and in his early twenties became so well known for his poetry as to excite the jealousy of the Emperor Nero. Nero forbade him to recite in public, and Lucan retaliated for this insult by joining in the conspiracy of Piso. He was betrayed, and in order to save himself offered to give information. He began by denouncing his own mother, and went on to reveal the names of all his fellow-conspirators.

He did not succeed, however, in his design of saving his own miserable life. He committed suicide on compulsion by means of opening his veins, and died reciting some lines of his own composition about a soldier who died in like fashion.

Lucan was a very young man when he died, and his work has all the defects of a young man's work. A large proportion of his faults, however, are due to the faulty system of Roman education, which increased his natural tendency to prefer epigram to truth, and encouraged him to endeavour continually to make a point. He had many of the qualities of a great poet; he was copious in his diction, lively in his imagination, and bold in his political wisdom. His fluency of writing was fatal to his greatness. He is, however, easily the greatest poet of the Silver Age.—BIBLIOGRAPHY: C. E. Haskins and W. E. Heitland, *The Pharsalia* (the best English edition); Sir Edward Ridley, *Lucan's Pharsalia Translated*.

LUCANIA, an ancient division of Southern Italy which extended across from the Tyrrhenian Sea to the Gulf of Tarentum. The Lucanians were a branch of the Samnite nation, and were subdued by the Romans in 272 B.C.

LUCAS, Edward Verrall, English author. Born in 1865, he was educated privately. He began to write, and in 1902 joined the staff of *Punch*. He made a reputation as a humorist by the skits written with C. L. Graves, including *Wisdom While You Wait* and *Hustled History*. Some of his works are travel books, such as *A Wanderer in London*, and others are anthologies such as *The Open Road*. Some deal with art and others are novels of a somewhat discursive kind. A selection shows his versatility: *Highways and Byways in Sussex*; *Over Bemerton's*; *Mr. Ingleside*; *A Boswell of Baghdad*; *John Constable the Painter*; and *A Wanderer among Pictures*. About 1924 he became chairman of the publishing firm of Methuen & Co., Ltd. He was made a Companion of Honour in 1932.

LUCAS, John Seymour, English painter. Born in London, 21st Dec., 1849, he was apprenticed to a wood carver, but later studied painting at the Royal Academy schools. His paintings of historical scenes won for him a considerable reputation, notable ones being "The Armada in Sight" and "After Culloden." He also painted a panel for the Royal Exchange, London. Lucas was made A.R.A. in 1886 and R.A. in 1898. He died 8th May, 1923.

LUCCA, a province of Tuscany, Italy. It is mountainous in the north, lying in the Serchio Valley, but is agriculturally productive. The chief seaport, Viarregio, exports oils, wines, silks, and fruits. Area, 685 sq. miles; pop. (1931), 339,991.

LUCCA (ancient **LUCA**), a city and capital of above province, on the Serchio (ancient *Ausar*). The seventh-century church of S. Frediano was founded by the Lombard kings Bertharic and Cunibert to honour St. Frigidianus, an Irish archbishop of Lucca (560–578). The Romans established a colony in Luca about 177 A.D., and it was included in *Gallia Cisalpina*. In 1805 Lucca formed, with Piombino, a principality given by Napoleon to his sister, Princess Elisa Bacciocchi. It was incorporated in the Kingdom of Italy in 1860. Pop. (commune, 1931), 81,807.

LUCERA, a city of Foggia, Southern Italy, with a castle erected by the Emperor Frederick II (of Germany) and rebuilt by Charles I (about 1275), and a Gothic cathedral. Lucera was a Roman colony (*Luceria*) from 314 B.C., but was destroyed in A.D. 663. It was restored by Frederick II, who colonized it with Saracens from Sicily (1223). Frederick died (1250) at the Castel Fiorentino, near Lucera. Pop. 17,000.

LUCERNA'RIA (Lat. *lucerna*, a lamp), the typical example of the Lucernariidæ, a family of the Scyphozoa, nearly allied to many of the jelly-fishes. The most familiar species is the *Lucernaria* (*Haliclystus*) *auricula*, a little, somewhat bell-shaped organism which is frequently found adhering by its short stalk to seaweeds, &c. The mouth is situated in the centre of the bell. It can detach itself at will and swim freely about by contracting and expanding the bell-shaped disc or 'umbrella,' as it is technically called.

LUCERNE (lū-sern'; Ger. *Luzern*), a city and capital of the canton of Lucerne, Switzerland, on the margin of Lake Lucerne and on the swift-running Reuss, where it emerges from the lake. On the landward side the town is surrounded by walls with nine watch-towers dating from 1385, and the river is spanned by eight bridges, two of which are roofed-in and span the river obliquely. The 'Lion of Lucerne,' a monument by Thorwaldsen (1821) to the Swiss guards who fell while defending the Tuileries (10th Aug., 1792) is noteworthy. The glacier-garden contains relics of the ice period. Lucerne is one of the three seats of the Swiss Diet, has an important grain market, and manufactures silk and cotton fabrics, and carriages. Pop. (1930), 47,066.

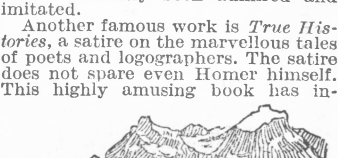
LUCERNE, LAKE OF, or **VIERWALDSTÄTTER-SEE,** meaning 'Lake of the Four Forest Cantons,' a Swiss lake bounded by the cantons of Uri, Schwyz, Unterwalden, and Lucerne, and noted for its magnificent scenery and historical associations. Length from Lucerne to Flüelen, 23 miles; width, from ½ to 2 miles; greatest depth, 700 feet; altitude 1,434 feet.

LUCERNE (Medicago), a genus of leguminous plants containing at least ninety species. The purple medick (*M. sativa*) is a valuable pasture and forage plant extensively cultivated in some of the chalky districts of England and France, and also in America. It is perennial and yields two or more crops in the year. In California it is known by the Spanish name of **Alfalfa.**

LUCIAN (Lucianus), Greek satirist, was born at Samosata in about A.D. 125, and died soon after A.D. 180. Most of the information which we possess about him is derived from his own writings, and, as it is never quite certain when he is serious and when he is not, it is impossible to be sure of the value of this information. The usually accepted story is that he began his career as apprentice to his uncle, a sculptor, but soon tired of this profession and became a rhetorician.

Eighty-two pieces have come down to us under the name of Lucian. Five of these are undoubtedly spurious, eight others and the epigrams are almost certainly spurious, and several others are of doubtful authenticity. Among so many writings, it is only possible to select a few of the best for special mention. The *Dialogues of the Dead*, *Dialogues of the Gods*, and *Dialogues of the Sea-Gods* are perhaps the most famous of Lucian's works. Witty, cynical, and irreverent, they have constantly been admired and imitated.

Another famous work is *True Histories*, a satire on the marvellous tales of poets and logographers. The satire does not spare even Homer himself. This highly amusing book has inspired the production of even greater books, such as *Gulliver's Travels*, and the masterpieces of Rabelais. *Lucius, or the Ass* is of doubtful authenticity, but it is an interesting romance in miniature. It tells the same story that Apuleius tells with many amplifications and in a more mystical fashion in his *Golden Ass*.



Lake of Lucerne

Concerning the Death of Peregrinus and *Alexander, or the False Prophet* expose with great wittiness the hypocrisy of two religious imposters. *The Lover of Lying* discusses the reason why some persons take a delight in lying for its own sake. The *Banquet* and the *Sale of Lives* are delightful satires on philosophers and philosophy. Lucian is at his best when attacking quack-philosophers, especially those of the Cynic school.—BIBLIOGRAPHY: H. W. L. Hime, *Lucian: the Syrian Satirist*; M. Croiset, *Essai sur la Vie et les Œuvres de Lucien*; W. L. Collins, *Lucian* (Ancient Classics for English Readers Series); C. Martha, *Les Moralistes sous l'Empire romain.*

LUCIFER (or in Greek, *Phosphoros*, both meaning *light-bearer*), a name anciently given to the planet Venus as the morning star. The term is used figuratively by Isaiah (xiv, 12) and applied to the Babylonian king, but

it was mistaken by the commentators for a reference to Satan. The passage runs as follows: "How art thou fallen from heaven, O Lucifer, son of the morning!" The name of Lucifer was used in this sense by Milton.

LUCIL'IUS, Gaius, an early Roman satirist, grand-uncle to Pompey the Great, born at Suessa 180 B.C., died at Naples about 103 B.C. He is considered the inventor of the Roman satire, because he first gave it the form under which this kind of poetry was carried to perfection by Horace, Juvenal, and Persius.

LUCINA, goddess of light, among the ancient Romans, a title given to Diana in her capacity of the goddess who presided over child-birth.

LUCKNOW', a city of India, capital of a division of the province of Agra and Oudh. It lies along the River Gumti. Among the most notable buildings are the Kaisarbagh, a palace built by Wajid Ali in 1850; the Imâmbarra or mausoleum of Asoof ud Dowlah; the great mosque called the Jamá Masjíd, now a jail; the Hoseinabad or Small Imâmbarra, with the mausoleum of Mahommed Ali; the Martinière founded by General Martin, which clothes and educates 120 boys, the Canning College, and several English schools; also St. John's church, American and Roman Catholic churches; library, hospitals, lunatic asylum, and a new university.

Lucknow was one of the chief scenes of the Indian Mutiny (1857–8). At the beginning of the mutiny the Residency was fortified by Sir Henry Lawrence, and after his death (4th July, 1857) it was closely besieged by the rebels till relief was brought by Havelock and Outram. The relieving force was only a small one, however, and the British were again besieged, partly in the Residency, partly in a walled garden called the Alambágh.

In the middle of October Sir Colin Campbell gained possession of the place after severe fighting; but as it seemed impossible to hold it with the troops at his disposal he left Sir James Outram to defend the Alambágh, and removed the civilians, women, and children to Cawnpore. At last, in March, 1858, Sir Colin returned with a sufficient force, completely defeated the rebels, and permanently recovered the town. Lucknow, once famous for the production of costly jewellery, has still important productions in silver, copper, and brass wares. Pop. (1931). 274,659.

LUCRE'TIA, a Roman lady who was outraged by Sextus, son of Tarquinius Superbus, King of Rome. She stabbed herself, and her death was the signal for a revolution, by which the Tarquins were expelled from Rome and a republic formed. The story is told by Livy (i, 57–59).

LUCRE'TIUS (Titus Lucretius Carus), Roman poet, author of the greatest of all didactic poems, was born about 98 B.C., and died about 55 B.C. Of the events of his life we know almost nothing. Our sole authority is St. Jerome's *Chronicle*, which has this entry under the year 94 B.C.: "Titus Lucretius the poet was born. He was subsequently driven mad by a love-philtre. In his lucid intervals he wrote some books which Cicero subsequently edited. He committed suicide in the forty-fourth year of his age."

The truth of all these statements has been questioned. Lucretius was certainly born before 94 B.C., probably in 97 B.C., or 95 B.C. at the very latest. It is exceedingly unlikely that any drug, no matter what its potency, could cause a permanent mental derangement. It is even more unlikely that so long a poem as the *De Rerum Natura* could have been composed during lucid intervals of sanity. It is not a short poem, like those of Cowper, but a poem of over seven thousand lines in length, and a model of close reasoning and clear exposition. It is doubtful whether it was Marcus or Quintus Cicero who edited the poems. Marcus was not in sympathy with the Epicurean system of philosophy, and it is curious that there is no mention in his *Epistles* of his editorial labours. Donatus, who mentions Lucretius's death as having taken place in 55 B.C., does not give any hint of suicide.

De Rerum Natura. The great work of Lucretius is a poem in six books entitled *De Rerum Natura*. The first book alone seems to have received the author's finishing touches. The last book breaks off abruptly, and the fourth and fifth show certain redundancies and gaps in the logical order of argument which make it clear that they were not revised by the author. The *De Rerum Natura* is a complete system of philosophy written in the form of a poem. The foundation-stone of the whole magnificent structure is to be found in the line which concludes the unmatchable proem—the address to Venus:

> Tantum religio potuit suadere malorum!

Lucretius was convinced in his heart that all human ills were due directly or indirectly to superstition —especially to fear of the gods and fear of death. He thought that if men were taught the truth, that the gods did not interfere in human affairs,

and that death brought complete extinction, they would not be afraid of anything in this world or the next. He therefore set out to expound in full the Epicurean system of philosophy, which in his opinion satisfactorily explained all the phenomena of the universe.

Book i opens with the address to Venus, and denounces the evils caused by superstition. It then goes on to explain that nothing can be made from nothing, and that nothing can be reduced to nothing. The rest of this book and the whole of the second book are devoted to an explanation of the atomic theory. The third book distinguishes between the vital and intellectual principles, the *Anima* and the *Animus*, or the soul and the mind, and proves that they are an integral part of the body and can no more have an independent existence than a hand or a foot can. The soul therefore perishes with the body. This book ends with a magnificent passage—unsurpassed in Latin literature—on the folly of fearing death, which effectually extinguishes all our desires and sorrows.

The fourth book deals with the theory of the senses, discusses the nature of sleep and of dreams, and ends with a slightly satirical disquisition upon love. The fifth book, which is in many ways the most impressive and interesting, treats of the origin of the world, and of the rise and progress of man, the beginnings of civilization and society, and the invention of the applied and the fine arts. The last book gives an explanation of thunder, lightning, hail, rain, snow, and other phenomena, and ends with a discourse upon diseases and a description of the great plague at Athens.

Theories. The subject-matter of Lucretius is most interesting to modern readers. Owing to a combination of good luck and good sense he has hit on many theories which have only been fully worked out comparatively lately. His account of the atomic theory is surprisingly logical and complete. He has grasped the idea that time is a relative thing. He gives a wonderfully accurate description of the origin of species, and enunciates the law of the survival of the fittest. He propounds something not unlike the germ theory of disease. He argues that the world was not specially made for mankind, because if it were it would not be encumbered with so many defects. His views upon heredity (Book iv, line 1218) are in curious accordance with those of the Abbé Mendel. Above all, his account of the rise and progress of civilization is in striking agreement with the views of leading anthropologists of to-day. This aristocratic Roman, who had probably never travelled and never seen any savage races, by a sheer gift of imagination was able to reconstruct the life of primitive man.

Appreciation. Lucretius is, as it were, only incidentally a poet. His main object was to teach, and to free mankind from the shackles of superstition. Much of his material was not susceptible of poetic treatment; he devotes much space to close and cold scientific reasoning. He might well have written in prose had literary fashion permitted. Yet in spite of the numerous defects of his poem it contains some passages unsurpassed nor merely in Latin literature, but in human speech. Lucretius is not only a great poet, but a great pioneer in poetry. He found the hexameter rough and crude, and he left it a perfect instrument, ready for Virgil to use.

There is one quality which, more than any other, makes the *De Rerum Natura* the greatest of all Latin poems. This is its absolute sincerity. It is uncorrupted by that taint of rhetoric which spoils the work of so many of even the best Latin writers. Lucretius scorns the exaggerations and epigrammatic sayings which most Romans delighted in. He is equally sincere in his thinking. He faces unflinchingly all the greatest problems of life. It is this sincerity, no less than his marvellous insight and his absolute command over the haughty Roman tongue, that makes him the loftiest of Roman poets.—BIBLIOGRAPHY: H. A. J. Munro, *Lucretius* (Text, Commentary, and Prose Translation); J. Masson, *Lucretius: Epicurean and Poet*; C. Martha, *Le Poème de Lucrèce*; W. Y. Sellar, *Roman Poets of the Republic*; W. H. Mallock, *Lucretius* (Ancient Classics for Modern Readers Series).

LUCULLUS, Lucius Licinius, a distinguished Roman naval and military commander, born about 115 B.C., died before 56 B.C. He distinguished himself greatly in his various victorious campaigns against Mithridates, King of Pontus, from the time of Sulla to 66 B.C., when he was supplanted by Pompey. He thenceforward lived in luxurious retirement on the coast of Campania. His house was enriched with a valuable library and works of art, which were freely opened to literary men of all kinds, among whom was his friend Cicero. His example induced other distinguished Romans to draw learned men to Rome at their expense. Lucullus is one of the interlocutors in Cicero's *Academica*.

LUCY, Sir Henry William. English humorist. Born in Liverpool in 1845, he was there educated. After a period in business, he became a reporter on a journal in Shrewsbury in 1864. In 1873, having been for a time in Paris, he joined the staff of *The Daily News*, and in 1881 became a member of the *Punch* staff. He was knighted in 1909 and retired in 1916. Lucy made his reputation as a reporter of debates in Parliament and by the skill with which he obtained information of value for his papers. The sketches of the proceedings in Parliament which he wrote for *Punch*, signed Toby M.P., were a feature of that journal. Lucy wrote a number of books, including *Memoirs of Eight Parliaments* and *The Diary of a Journalist*. He died 20th Feb., 1924.

LUDENDORFF, Erich von, German general, born 1865, educated in the Cadet School at Plön, and posted to the infantry in 1882. In 1893 he joined the General Staff, and lectured in the Military Academy, Berlin, until 1908. He was also engaged till 1913 (from about 1904) in advising the Operations Staff, who were completing a war programme in anticipation of the German bid for world domination. In 1914 he became chief of this department, and on mobilization he was a major-general and acted as Deputy Chief of Staff to the Second Army, under von Bülow. Eventually he was posted to Hindenburg, whose Eighth Army was engaged on the Russian front, and, as Chief of Staff, Ludendorff directed the great drive that culminated in the slaughter of Tannenberg and the shambles of the Masurian Lakes; he directed the campaign, and Hindenburg reaped the laurels.

After the German failure at Verdun, Hindenburg became Chief of General Staff. Ludendorff followed him as Quartermaster-General (26th Aug., 1916), and together they controlled the German army from that time until it was defeated on the *Siegfried Line*. Ludendorff perfected the Hindenburg Line, and organized the German retreat thereto in 1917, where he prepared for his magnificent but disastrous offensive of 1918 by training in mass tactics 106 specially selected and equipped divisions.

Of his strategy it might be said, in parody of the comment on Balaclava, that it was magnificent, but it was not war; it was the highest expression of German iron discipline and of the 'hammer blow.' Had Ludendorff been content in 1918 with storming the British lines, and had he abandoned the plan that led to the disaster on the Lys, the honours might have rested with the German armies, and the European War might have had a very different ending. Ludendorff resigned on 27th Oct., 1918, because, it was stated, "he felt unable to acquiesce in constitutional changes, particularly in the restriction of the Kaiser's authority with regard to army appointments." He settled in Munich, and from time to time appeared in public life, once as an opponent of the republic. He wrote books on the war: *My War Memories, The General Staff and its Problems*, and *Warfare and Politics* (1919).—BIBLIOGRAPHY: In addition to the above-mentioned works, H. von Zwehl, *Die Schlachten im Sommer 1918 an der Westfront*.

LUDGATE, one of the old gates of the city of London. It was near where the Old Bailey now stands and owed its name to the legend that it was built by King Lud. It was used as a prison for debtors and was pulled down in 1760. The name is now borne by Ludgate Circus, where Fleet Street meets Farringdon Street and New Bridge Street, and Ludgate Hill, which leads from the Circus to St. Paul's Cathedral.

LUDI, a term which comprises the various spectacles and contests of the circus and of the theatre and stadium in Rome and Italy. The great games of the Republic were said to date back to the time of Tarquinius Priscus. There were two principal kinds of games: *ludi scœnici*, the spectacles of the theatre; and *ludi circenses*, the contests of the amphitheatre or circus.

The principal games were: (1) *Ludi Megalenses*, 4th–10th April, mainly scenic; (2) *Ludi Cerealcs*, 12th–19th April (only one day was devoted to the circus); (3) *Ludi Florales*, 28th April–3rd May, essentially scenic; (4) *Ludi Apollinares*, 6th–13th July (only one day devoted to the circus); (5) *Ludi Victoriæ Cæsaris*, 20th–30th July, gladiatorial shows; (6) *Ludi Romani*, 4th–18th Sept. (the oldest and most important of the games, both *scœnici* and *circenses*); (7) *Ludi Victoriæ Sullanæ*, 26th Oct.–1st Nov.; (8) *Ludi Plebeii*, 4th–17th Nov. The *ludi sollemnes* occupied altogether seventy-six days in the year, of which fifty-five were devoted to *ludi scœnici* and the rest to *ludi circenses*.

LUDLOW, a municipal borough of Shropshire, England, at the confluence of the Teme and Corve, with the ruins of a Norman castle, destroyed by fire in 1646. Tanning and milling are the chief industries. Ludlow originated in this castle, which was frequently a royal residence. Milton's *Comus* was first performed at Ludlow in 1634, and here Butler wrote *Hudibras*. One

of the town gates (Broad Gate) is still extant. Pop. (1931), 5,642.

LUDWIG, the German form of *Louis* and *Lewis.* The German emperors who bore this title are as follows:

	Born.	Died.	
Ludwig I	778	840	Son of Charlemagne.
Ludwig II	825	875	Son of Lothaire I.
Ludwig III	880	929	Grandson of Ludwig II.
Ludwig IV	893	911	Son of Arnulph.
Ludwig V	1288	1347	Elected Emperor.

See FRANCE; BAVARIA; GERMANY; LOUIS.

LUDWIGSBURG, a town of Württemberg, Germany, founded by Duke Eberhard Ludwig of Württemberg in (about) 1705, and formerly the military depot of the duchy. Pop. 28,994.

LUDWIGSHAFEN-AM-RHEIN, a town of Bavaria, founded by Louis I (Ludwig), King of Bavaria, in 1843. It stands on the Rhine opposite Mannheim, and has a good harbour and vast chemical works. The Allies bombarded the town from the air during the European War, when it was a German air-craft depot. Pop. (1925), 101,869.

LUFFA, a genus of Cucurbitaceæ. The familiar loofah consists of the dry remnant (vascular system) of the gourd-like fruit.

LUGANO, a lake of Central Europe, the bulk of which is in the canton of Ticino, Switzerland, the north-east area being in Italy. It is situated between Lakes Maggiore and Como, and is approximately 20 miles long by 1½ miles broad. The greatest depth is 945 feet. It is the ancient *Ceresius Lacus.* There is a regular lake-steamer service.

LUGANO, the largest town of the canton of Ticino, Switzerland, 905 feet in altitude, on the north shore of Lake Lugano. Politically the town is Swiss, otherwise it is Italian. The fifteenth-century church of San Lorenzo is the main historical building. Pop. (1930), 15,184.

LUGARD, Frederick John Dealtry, Baron. British administrator. Born 22nd Jan., 1858, and educated for the army, he first saw service in the Afghan War, 1879–80. With the exception of five years' governorship of Hong-Kong, 1907–12, his work has been confined to Africa, first in establishing and protecting British interests, then as High Commissioner of Northern Nigeria, 1899, Governor of Northern and Southern Nigeria, 1912, and finally Governor-General of all Nigeria. He has always sought to improve the conditions of the natives, doing much to abolish slave trading. He retired in 1919, was made Privy Councillor, 1920, and was appointed to the permanent mandates commission of the League of Nations, 1922. He was created a baron in 1928.

LUGGER, a small vessel carrying either two or three masts and sometimes a running bowsprit. The masts

Lugger

carry each one or two lug-sails and on occasion topsails and jibs. The lug-sails are hung obliquely to the masts. These vessels sail particularly well close to the wind and close hauled.

LUGO, a maritime province of North-Western Spain, with a seaboard on the Bay of Biscay. It is very mountainous and afforested, and devoted mainly to agriculture and stock-raising. Lugo was repeatedly devastated by the French under Soult, Ney, and Marchand in the Peninsular War. Area, 3,814 sq. miles; Pop. (1931), 460,726.

LUGO, capital of the above province, on the River Minho, at an altitude of 2,050 feet. It is the *Lucus Augusti* of the Romans, who built the city walls, which are still extant. Lugo was successively in the hands of the Suevi, Moors, Normans, and Alfonso III, and was sacked by the French (1809)

and Carlists (1835). The cathedral was built in 1129, but has been modernized in parts. Pop. 31,137.

LUINI (lu-ē'nē), **Bernardino,** a painter of the Lombard school, and the most distinguished pupil of Leonardo da Vinci, was born at Luino, a village on Lake Maggiore, about 1475, died perhaps about 1540. His works, both in oil and fresco, are much admired. Of the latter one of the most important is a *Crucifixion* of great size and with various supplementary scenes on the wall of a chapel at Lugano.

LUKE, ST., the evangelist, author of the Gospel which bears his name and of the *Acts of the Apostles*. He was probably born at Antioch, in Syria; was taught the science of medicine, but the tradition that he was also a painter is doubtful. The date of his conversion is uncertain; he is supposed to have been one of the seventy disciples, and also one of the two who journeyed to Emmaus with the risen Saviour. He was for several years a companion of the Apostle Paul in his travels, so that in the *Acts of the Apostles* he relates what he himself had seen and participated in. (*See* ACTS OF THE APOSTLES.) Luke is apparently mentioned three times in the New Testament: *Col.* iv, 14; 2 *Tim.* iv, 11; *Philem.* 24. He lived to an advanced age, but whether he suffered martyrdom or died a natural death it is impossible to determine.

The *Gospel of St. Luke* was written probably about A.D. 58–60. It is addressed to a certain Theophilus, and records various facts connected with the early life of Jesus which were probably furnished to the writer by Mary herself. It is first quoted by the Church writers Justin Martyr and the author of the *Clementine Homilies*, and at the time of Irenæus and Tertullian the Gospel in its present form was fully accepted. *See* GOSPEL.—Cf. Sir W. M. Ramsay, *Luke the Physician, and other Studies*.

LULLY, Jean Baptiste, French composer. He was born in Italy in 1633, but when a young man settled in France and became a Frenchman. He spent his life at the court of Louis XIV, first as a violinist, and finally as music master. He died in Paris, 22nd March, 1687.

Lully was a very successful composer. He wrote many operas in which he made the ballet an essential part, and with him Molière was associated. His works include, *Alceste, Atys, Thésée* and other operas.

LULLY, Raymond (*Doctor Illuminatus*), scholastic philosopher, born in Majorca about 1235, died in Algeria 1315. When about thirty years of age, he renounced the world and devoted himself to philosophy and religion. Encouraged by visions, he undertook the task by studying the Eastern languages in order to convert the Moslems. For this purpose he made several journeys into Northern Africa, during one of which he was stoned to death. He was canonized in 1419. The number of his works is usually estimated at 300. They include treatises on logic, metaphysics, grammar, theology, casuistry, geometry, astronomy, and medicine.

LULWORTH, name of two villages of Dorset. **East Lulworth** is about 5 miles south-east of Wareham. Pop. 1,068. **West Lulworth** is 2½ miles distant. Pop. 500. Near is **Lulworth Cove,** a holiday resort.

LUMBAGO is pain in the muscles of the lower part of the back, due to pathological changes in them, and is one of the common minor maladies. It is a form of muscular rheumatism, and may arise after exposure to wet and cold, or after unaccustomed strain or injury to the muscles. The pain, which is sharp and cramp-like in character, comes on suddenly, and is much aggravated by any movement which stretches the muscles, with the result that the patient walks slightly bent forward and holds the spine rigid. After a time the pain becomes less intense and more diffuse. Rest and the application of warmth to the back are the two most important steps in treatment, while large doses of salicylates are usually given. The condition frequently becomes chronic, and leads to stiffness of the back.

LUMINOUS PAINT, a paint containing phosphorescent materials which emit a feeble glow in the dark after being exposed to sunlight or other light rich in ultra-violet rays. The earliest-known luminous paint was 'Bologna phosphorus,' which consists of impure barium sulphide prepared by heating barium sulphate with carbon. The sulphides of calcium and strontium are also used, and behave in a similar manner. A luminous paint which will continue to glow in the dark indefinitely and does not need to be exposed to light is made by incorporating a very small quantity of a radium compound with a phosphorescent substance. Such paints are now used for illuminating gun-sights, compasses, and other instruments when used at night.

LUMP-FISH, or **SUCKER** (*Cyclopterus lumpus*), a spiny-finned fish, so named from the clumsiness of its form. The back is arched and sharp, the

belly flat, the body covered with numerous bony tubercles, and the ventral fins modified into a sucker, by means of which it adheres with great force to any substance to which it applies itself.

LUNACY, in law. Lunatics are not legally responsible for their acts, but, before the law, all persons are considered sane until the contrary is proved. In England, when it appears that at the time of committing a criminal act the accused was insane, a special verdict, 'guilty but insane,' is returned, and the accused is remitted to custody during the king's pleasure. If, though sane at the time of the offence, he is insane when brought to trial, the trial is not proceeded with, but he is detained in custody during the king's pleasure. In the affairs of a lunatic the Crown is, by law, trustee of the estate, and powers of administration are vested in the Lord Chancellor.

When a person is sent to a lunatic asylum, the person sending the lunatic must obtain certificates of lunacy, under the proper forms, from two medical men. The lunatic can demand an inquiry into his case before a jury by petition to the Lord Chancellor, such inquiry to be confined to the question whether the alleged lunatic is of unsound mind and incapable of conducting his own affairs. What constitutes irresponsibility is still a point of much obscurity. In Scotland the care and custody of lunatics belong to the Court of Session, and an examination of an alleged lunatic is held before a judge and jury.

LUNATIC ASYLUMS, houses established for the treatment of insane persons. Some are established by law, others by the endowments of charitable donors, while others are private establishments.

Until near the close of the eighteenth century many lunatics were allowed to wander at large, exposed to all the arbitrary cruelty to which their defenceless condition made them liable, while those who were confined in asylums were in a still worse case. Chains, whipping, and confinement in dark dungeons were among the ordinary discipline of these establishments. Although the chief credit for urging a more human and reasonable treatment is due to the English Quakers, the reformation of this unnatural system was begun in France by Philippe Pinel, a benevolent physician; and in England a parliamentary inquiry in 1815 into the barbarities hitherto practised in lunatic asylums led to a slow but gradual improvement.

Lunatic asylums, whether public or private, are now under the control of officers appointed under special statutes, and lunatics must be visited at least once a year by medical and legal visitors. The general conduct of lunatic asylums is now brought more into harmony with humanity, but earnest efforts are being made to introduce reforms, so as to ensure the more efficient treatment of insanity in the early and more hopeful stages of the disorder. Violence and undue coercion have been generally abandoned, persuasion and tact being relied on for the control of the patients. Religious services and recreations of various kinds are also provided.

LUND, an ancient town of Malmö, Sweden, said to have been a wealthy stronghold in the tenth century. In 1048 the first bishop was appointed, and in 1104 the bishopric was elevated into an archiepiscopal see. The university was founded in 1668, and the Romanesque cathedral was consecrated in 1145. Pop. (1932), 23,138.

LUNDY, an island of Devonshire, England, lying at the entrance of the Bristol Channel, 2½ miles long and 1 mile broad; area, about 1,000 acres. It belonged to the pirate family of Marisco, who built a castle and round towers. The island is granite. There are two lighthouses. The family of Heaven owned the island from 1813 to 1916, but it was bought in 1917 by A. L. Christie. Pop. 49.

LÜNEBURG (lü'ne-burh), a town of Hanover, Prussia, on the Ilmenau, with a thirteenth-century town house, gypsum- and lime-quarries, and a salt-mine. Pop. 28,899.

LUNÉVILLE, a town of Meurthe-et-Moselle, France, at the confluence of the Vezouse and Meurthe. The Peace of Lunéville between France and Austria was signed in Lunéville, 3rd Feb., 1801. During the European War the town was occupied by the Germans (Aug. 1914), but was evacuated in September of that year. Pop. 24,668.

LUNGS, the sole breathing organs of reptiles, birds, mammals, and in part of amphibians (frogs, newts, &c.), the latter forms breathing in early life by branchiæ or gills, and afterwards partly or entirely by lungs. The essential idea of a lung is that of a sac communicating with the atmosphere by means of a tube, the *trachea* or windpipe, through which air is admitted to the organ, and through structural peculiarities to its intimate parts, the air serving to supply oxygen to the blood and to remove carbonic acid.

In the Mammalia, including man, the lungs are confined to and freely suspended in the cavity of the thorax

or chest, which is completely separated from the abdominal cavity by the muscular diaphragm or 'midriff.' In man the lungs are made up of honeycomb-like cells which receive their supply of air through the bronchial tubes. If a bronchial tube is traced, it is found to lead into a passage which divides and subdivides, leading off into air-cells. The walls of these air-cells consist of thin, elastic, connective tissue, through which run small blood-vessels in connection with the pulmonary artery and veins. By this arrangement the blood is brought into contact with, and becomes purified by means of the air. The impure blood enters at the root of the lung through the pulmonary artery at the right side of the heart, and passes out purified through the pulmonary veins towards the left side of the heart. Both lungs are enclosed in a delicate membrane called the *pleura*, which forms a kind of double sac that on one side lines the ribs and part of the breast-bone, and on the other side surrounds the lung. Pleurisy arises from inflammation of this membrane.

The lungs are situated one on each side of the heart, the upper part of each fits into the upper corner of the chest, about an inch above the collar-bone, while the base of each rests upon the diaphragm. The right lung is shorter and broader than the left, which extends downwards further by the breadth of a rib. Each lung exhibits a broad division into an upper and lower portion or *lobe*, the division being marked by a deep cleft which runs downwards obliquely to the front of the organ; and in the case of the right lung there is a further division at right angles to the main cleft. Thus the left lung has two, whilst the right lung has three lobes. These again are divided into *lobules* which measure from $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter, and consist of air-cells, blood-vessels, nerves, lymphatic vessels, and the tissue by which the lobules themselves are bound together.

The elasticity of the lungs by which they expand and expel the air is due to the contractile tissues found in the bronchial tubes and air-cells, this elasticity being aided by a delicate, elastic, surface-tissue. (*See* RESPIRATION.)

LUNGWORT, *Pulmonaria officinalis*, nat. ord. Boraginaceæ, a common garden flower, having red and purple tubular blossoms, and leaves speckled like diseased lungs, hence an old-fashioned remedy in pulmonary diseases.

LUNN, Louise Kirkby. English singer. Born in Manchester, 8th Nov., 1873, she studied music in London. In 1893 she appeared on the concert platform and became one of the leading singers of the day. For three years she was with the Carl Rosa Company, and she sang much at Covent Garden, London, and made frequent tours abroad. She died in 1930.

LUPINE (Lupinus), a very extensive genus of hardy annual, perennial, and half-shrubby plants, some of which are cultivated in gardens for the sake of their gaily-coloured flowers. They belong to the nat. ord. Leguminosæ.

LU'PULIN, the fine yellow powder of hops, which contains the bitter principle. It consists of little round glands, which are found upon the stipules and fruit, and is obtained by drying, heating, and then sifting the hops. It is largely used in medicine.

LUPUS is the most common form of tuberculosis of the skin. It appears as yellowish-brown areas, about the size of a hemp-seed, which usually run together, forming irregular patches. They are in the true skin, and the epidermis runs unbroken over them. Later the condition may take on different varieties, according to complications and secondary changes. The most common situation for lupus to be found is the face, where it usually begins at the edge of the nose or eyelids, spreading outwards in the skin. It is also frequently seen in the neck, but may occur in the skin of any part of the body. It spreads slowly, but, if left untreated, leads to much destruction of tissue and disfigurement. The most satisfactory methods of treatment are X-rays, Finsen light, or radium.

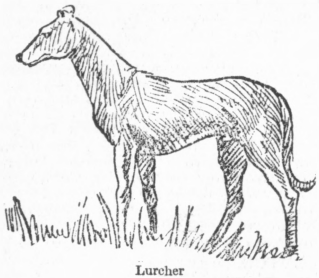
LURCHER, a dog that lies in wait for game, as hares, rabbits, partridges, &c., drives them into nets, runs them down, or seizes them. This species of dog is said to be a cross between the collie and the greyhound, and is more used by poachers than by sportsmen.

LURGAN, a market-town of Armagh, Northern Ireland. The town was founded by William Brownlow in the reign of James I, and the house of his ancestors (the Lords Lurgan), an Elizabethan mansion, is near. The town is noted for its linen manufactures. Pop. (1926), 12,499.

LURISTAN', a mountainous province of Western Persia, with an area of about 15,060 sq. miles. It is named after the Luri, a race divided into many tribes, all migratory and warlike. The only town is Khorrámabad, situated in a fruitful plain south of Hamadan. Pop. about 350,000.

LUSHAI HILLS, a wild district on the north-east frontier of India, lying

along the southern side of the Assam district of Cachar, the east side of the Bengal district of Chittagong, and extending on the east into Burmah. This territory is occupied by numerous nomadic tribes called Lushais or Kukis, who, since the expedition of



Lurcher

1871, have been submissive to British rule. The district was annexed by Britain in 1890. The natives bring down to the markets on the plains ivory, raw cotton, bees'-wax, and caoutchouc.

LUSITANIA, the ancient name of a large Roman province, comprising modern Portugal and the province of Estremadura, with part of Leon, Spain. The inhabitants were a Spanish tribe known as the Lusitani, and were brave and war-like in their resistance to the Roman invasion. Mérida, the ancient *Augusta Emerita*, was the Roman capital, but *Olisipo* (Lisbon) was the chief town of the Lusitani.

The **Lusitania** was a Cunard steamship that was sunk by a German submarine off the coast of Ireland, 7th May, 1915; 1,198 persons lost their lives. The vessel was one of 31,500 tons.

LUTE, a stringed musical instrument of the guitar kind, formerly very popular in Europe. It consists of four parts, viz. the table or belly with a large sound-hole in the middle; the body, ribbed like a melon, having nine or ten ribs or divisions; the neck, which has nine or ten stops or frets which divide the strings into semitones; and the head or cross, in which are fitted the pegs or screws for tuning the strings, of which there are five or six pairs, each pair tuned in octaves or unisons. The strings are struck by the fingers of the right hand and stopped on the frets by those of the left. The lute, known to the old Egyptians, was adopted by the Persians, from whom it passed to the Arabs. The latter introduced it into Spain, and during the fourteenth century it was introduced into other European countries.

LUTHER, Hans. German statesman. Born in Berlin, 10th March, 1879, he studied law and became a public official, first at Charlottenburg and then in Magdeburg. During the war period he was secretary of the association of German and Prussian towns, and from 1918–22 was burgomaster of Essen. In Dec., 1922, he returned to Berlin to become minister of food, and in Oct., 1923 minister of finance under Stresemann. He restored the German currency and in 1925 became Chancellor, in which capacity he was the German leader at Locarno. In May, 1926, he resigned.

LUTHER (lōō'thĕr; Ger. pron. lōō'tĕr), **Martin,** Protestant reformer, born at Eisleben 1483, and died there 1546. His father, a miner in humble circumstances, soon after Martin's birth removed with his family to Mansfield, where young Martin was brought up, piously but with some severity. At the age of fourteen he was sent to school at Magdeburg, whence he was sent in 1499 to Eisenach. In 1501 he entered the University of Erfurt, and in 1505 received the degree of Master.

About this time he discovered in the library of the university a Latin Bible, and found, to his no small delight, that it contained more than

Martin Luther

the excerpts in common use. He was destined by his father to the law, but his more intimate acquaintance with the Bible induced him to turn his attention to the study of divinity, with the view of entering monastic life. Contrary to the wishes of his father, he entered the monastery of the Augustines at Erfurt in 1505. In

1507 he was consecrated priest, and in 1508, by the influence of his patron, Staupitz, who was provincial of the Order, he was made professor of philosophy in the new University of Wittenberg.

In 1510 he visited the court of Pope Leo X at Rome on business connected with the Order. Returning to Wittenberg, he was made Doctor of Theology (1512). At that time he had no controversy with the Pope or the Church, but the arrival in 1517 of John Tetzel in Wittenberg selling indulgences for sins roused the fiery energy of Luther, and caused him to draw up his famous protest in ninety-five propositions, which he nailed to the church-door in Wittenberg. The result was that the sale of indulgences ceased, Tetzel fled, and a great religious commotion spread rapidly through Germany.

When summoned to appear before the German Emperor, Charles V, at the Diet of Worms (1521), Luther appeared, acknowledged his writings, made an eloquent defence, but refused to recant. When he retired in triumph from Worms, he was met by a friendly troop of soldiers belonging to Frederick the Elector of Saxony, who conveyed him to the castle of Wartburg, where he lay in concealment for nearly a year. Here he employed his time in translating the New Testament into German, but when he heard that disturbances had been excited in Wittenberg on the question of images, he could no longer bear the restraint of inaction. Returning suddenly, and at great danger to himself, Luther succeeded in quieting the people by means of a wise and patient moderation.

In 1524 he laid aside his cowl as a priest of the Roman Church, and in 1525 married Catharina von Bora, one of nine nuns who had renounced their religious vows under his teaching. The wisdom of this marriage was doubted by his friends, but the companionship of his wife and six children contributed greatly to the happiness of the reformer. From the year 1521 Luther had been busy translating the Bible into German with the aid of Melanchthon and others, and the great task was completed in 1534. This important work, taken in connection with the Protestant Confession made at Augsburg in 1530, served to establish the reformer's doctrines in Germany, and closed the important part of his public life. He continued, however, till the end his private work of teaching, preaching, and writing. The massive character of the German reformer lay along simple lines, and found its full and direct expression in his work.—

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LUTHERANS, the adherents of Luther, a term now applied to one of the great sections into which the Protestant Church on the continent of Europe is divided, the other being known as the Reformed or Calvinists. The doctrinal system of the Lutheran Church is contained in the Augsburg Confession (q.v.), and other documents, including the two catechisms of Luther. The fundamental doctrine is that we are justified before God, not through any merits of our own, but through faith in His Son. In the eucharist the belief of the Lutherans is known as consubstantiation (q.v.). The membership of the Lutherans is estimated at 60,000,000. In America they have a membership of 2,463,265.

LUTON, a municipal borough of Bedfordshire, England, on the River Lea, once the centre of the straw-plaiting industry, commemorated by the Plait Hall (formerly the straw-plait market). The chief industries today are the making of motor-cars and engineering products. The borough was enlarged in 1928. Luton is the ancient *Luytone.* Pop. (1931), 68,526.

LUTTERWORTH, a town of Leicestershire, on the Swift. In the church of St. Mary John Wycliffe was rector from 1374 to 1384, and the top of the present carved oak pulpit is stated to be part of Wycliffe's. He was buried at Lutterworth (1387), but his ashes were subsequently thrown into the Swift (1428). Pop. 2,092.

LUTYENS, Sir Edwin Landseer, English architect. He was born in London, 20th March, 1869, and was trained as an architect. His designs soon attracted attention and he became in time one of the outstanding figures in his profession. He was employed on the planning of Delhi, and was responsible for Government House and other buildings there. He also designed the Cenotaph in Whitehall, London, and several other war memorials. He was the architect chosen for the vast new Roman Catholic Cathedral at Liverpool. He was made A.R.A. in 1913, a knight in 1918, and R.A. in 1920. He was created K.C.I.E. in 1930.

LÜTZEN, a town of Prussian Saxony. At Lützen Gustavus Adolphus of Sweden defeated Wallenstein (16th Nov., 1632). In 1813 the allied Russian and Prussian armies under Wittgenstein and Blücher attacked Napoleon as the French were entering Lützen. After a terrific battle Napoleon was victorious. Pop. 4,086.

LUXEMBOURG (lůk-sån-bör), Francois Henri de Montmorency-Bouteville, Duc de, Marshal of France, born 1628, died 1695. He was related to and a close associate of Condé, with whom he engaged in the Fronde, and both fled to Spain. Luxembourg was pardoned in 1659, and in 1668 served under Condé. He defeated William of Orange (1672), and became famous by a retreat from Utrecht, defeating William, then King (William III) of England, again at Leuze (1691), Steenkirk (1692), and Neerwinden (1693).

LUXEMBOURG, palace in Paris, now a museum. On the left bank of the Seine, it was built early in the 17th century on land bought from the Duke of Luxembourg-Piney as a residence for Marie de Medici, widow of Henry IV. After a time it fell into decay, but it was restored in 1836 and converted into an art gallery. It contains a fine collection of modern paintings. There are some magnificent rooms decorated in the most sumptuous style, while the gardens are large and beautiful.

LUXEMBOURG, a southerly province of Belgium, adjoining the Grand-Duchy of Luxemburg, with which it was united until 1840. It is mountainous (Ardennes), and is the least populous district of Belgium. Area, 1,706 sq. miles; pop. (1931), 221,328.

LUXEMBURG, GRAND DUCHY OF, an independent state bordered by Rhenish Prussia, France, and Belgium. It forms part of the Ardennes Plateau, and drains almost entirely into the Moselle basin. The inhabitants are Teutonic, but French-speaking, and the predominant religion is Roman Catholicism. Mining is the principal industry, but agriculture is fairly extensive. Area, 999 sq. miles; population (1930), 299,782.

History. The tenth-century countship of Lützelburg was erected into a Duchy in 1354 as Luxemburg, and from about 960 until 1443 Luxemburg formed a part of the Holy Roman Empire. Between 1443 and 1506 it was united to Burgundy. The present Grand-Duchy forms the eastern half of the old Duchy of Luxemburg, and was in Spanish hands from 1506 to 1714, when it passed to Austria, changing over again in 1796 to the French, with whom it remained until 1815. By the Congress of Vienna it was raised from a Duchy to a Grand-Duchy and included (until 1866) in the German Confederation. By the Treaty of London (1867) it was declared neutral territory with a separate administration. On the death of William III of Holland (1890) the Grand-Duke Adolf of Nassau (1817–1905) succeeded as reigning Grand-Duke, and he in turn was followed by his son William.

During the European War Luxemburg was overrun by German troops (1st–2nd Aug., 1914), and plundered of raw material and food. It was evacuated on 11th Nov., 1918, and a referendum taken in 1919 placed the state under the Grand-Duchess Charlotte (born 1896), who succeeded her sister (abdicated) in Jan., 1919. The Grand-Duchy is governed by a Chamber of Deputies, and a Cabinet consisting of the Minister of State and four Directors-General. The state is in economic alliance with Belgium.—Cf. R. Putnam, *Luxemburg and her Neighbours*; G. Renwick, *The Grand Duchy of Luxembourg and its People.*

LUXEMBURG, a town and capital of the Grand-Duchy of Luxemburg, formerly *Lützelburg.* It was once a fortress of the German Confederation, and the fortifications, partly cut out of solid rock, were demolished under the Treaty of London (1867), only the Spanish towers and a few ruins now remaining. The construction of these works occupied 500 years (about 1313–1866), and the site is now a public park. Pop. (1930), 53,791.

LUXEUIL, a town of Haute-Saône, France, the ancient *Lixovium,* celebrated for its baths. Pop. 5,300.

LUXOR. *See* EGYPT; KARNAK; THEBES.

LUZ, the name of two cities of Palestine, one of which was Beth-el, and the other a hitherto unidentified Hittite city (*Judges* i, 23–26). The site of Beth-el is believed to be that of the present Beitin, a miserable place of some 300 inhabitants.

LUZON, the largest of the Philippine Islands. There are several volcanic peaks rising above 4,000 feet (Mayón, 7,916 feet). A railway runs from Manila to Lingayén Gulf (opened 1892). The population comprises aboriginal Negritos, Filipinos, and Chinese, with a European colony and some 3,000 Americans. Rice, manila, hemp, tobacco, coffee, and ginger are produced, and ebony is supplied by the afforested interior. Manila is the capital (pop. 1932, 341,034), other towns (with their pops. in 1932) being Laoag (42,046), Legaspi (34,560), Vigan (19,285), and Naga (9,468). Area, 40,814 sq. miles; pop. about 3,720,000.

LWOW. *See* LEMBERG.

LYAUTEY, Louis Hubert, Marshal of France, member of Académie Française and French colonial administrator, was born at Nancy in

1854. He graduated from St. Cyr in 1875 as lieutenant of chasseurs à pied, and saw service in Algeria (1880–2), Tonkin (1894–7), and Madagascar (1897–9, 1900–2), being appointed brigadier-general in 1903 and general of division in 1907. In 1912 he became Resident-General of Morocco (French sphere), and throughout the European War, except between 1916 and 18th May, 1917, when he was at the War Office, Lyautey consolidated French influence in Morocco and gained the unswerving loyalty of the native chiefs. He received the baton of a marshal in Feb., 1921. His *Lettres du Tonkin et de Madagascar* were published in two volumes during 1922; an English edition appeared in 1932.

LYCAN'THROPY (Gr. *lykos*, a wolf, and *anthrōpos*, a man), a belief that is very widespread among most of the peoples in all parts of the earth, both in ancient times and at the present day, that certain individuals have the power of transforming themselves, or of being transformed against their will, into wolves (or tigers, cats, or other carnivores) who roam abroad and inflict injuries upon human beings or damage to their property, and then resume their human shape and character. Such beliefs are held at the present day in parts of Europe, in Egypt and Western Asia, in Assam and China, and in America.

Lycanthropy, or the belief in werewolves or wereanimals, is very ancient. So far as can be discovered, the belief originated from the ancient Egyptian myth that when the Great Mother was impelled to destroy mankind to avenge their sins, she assumed the form of a lioness and was called the Destroyer (Sekhmet). *See* WEREWOLF.

LYCAO'NIA, an ancient district of Asia Minor, situated between Galatia, Cicilia, Cappadocia, and Isauria, of which the capital was Iconium (Konia), which was said by Xenophon to be a town of Phrygia, but is located in Lycaonia by all other writers. It was visited by Paul and Barnabas coming from Antioch of Pisidia (*Acts* xiv, 1), and is now included in the vilayet of Konia.

LYCEUM, grove outside Athens near a temple sacred to Apollo Lycius. As Aristotle and other philosophers taught here, the word was used later for a place of learning and this use has persisted, especially in France where lycées are very common.

The **Lyceum Theatre** in London is in Wellington Street, Strand. It was built in 1765, rebuilt in 1816 and burned down in 1830. In 1834 the present theatre was built. From 1878 to 1902 it was used by Henry Irving and Ellen Terry. Later it became associated with melodrama.

The **Lyceum Club** is a club for women, chiefly professional and artistic. It was founded in 1904 and its house is 138 Piccadilly, London, W.1.

LYCHNIS (lik'nis), a genus of usually erect, annual, biennial, and perennial herbs, belonging to the nat. ord. Caryophyllaceæ, or pinks. Some of them bear beautiful flowers. The scarlet lychnis, ragged robin, and rose campion are well known.

LYC'IA, an ancient maritime province in the south of Asia Minor, bounded by Caria on the west, Pamphylia on the east, and Pisidia and Phrygia on the north. It was colonized by the Greeks at a very early period, and its historical inhabitants were Greeks, though with a mixture of aboriginal blood.

LYCK, town of East Prussia. It stands on the River Lyck, 118 miles from Konigsberg. Near the borders of Germany, Lyck was an important place in the Middle Ages. Pop. 15,159.

During the Great War Lyck was occupied by Russian troops in Aug., 1914, and again in Oct. On Sept. 12, there was a battle near the town, the Russians being defeated and driven back.

LYCOPER'DON, a genus of Fungi, group Gastromycetes, commonly called *puff-balls*. In a young state they are edible.

LYCOPH'RON, born at Chalcis, in Eubœa, a Grecian poet and grammarian, the author of several tragedies, who lived at Alexandria, 280 B.C. Suidas gives the titles of twenty of his tragedies, but of all his writings there remains only his *Cassandra* (Alexandra), an iambic poem of about 1,500 lines. It is a continued soliloquy, in which Cassandra predicts the fall of Troy and the fate of all the heroes and heroines who shared its ruin.

LYCOPO'DIUM, a genus of plants of the nat. ord. Lycopodiaceæ. Six species are found in Britain, of which the most conspicuous is the *L. clavatum* or common club-moss, the yellow powder in the spores of which burns explosively, and is used for producing theatrical lightning. It is known as lycopode or vegetable brimstone.

LY'COPODS, or **LYCOPODIALES,** one of the primary subdivisions of the Pteridophyta, characterized by the small, spirally arranged leaves and the relatively bulky sporangia, borne on the upper surface, or in the axils of special leaves aggregated into terminal cones. The type-genus is Lycopodium, with about 100 species. Another section of the group, in which

ach leaf bears a *ligule*, comprises elaginella, with 500 species, mostly opical shade-plants, and Isœtes; also ie important fossil families Lepidoendreæ and Sigillariceæ, which consisted of large trees. The living ycopods are small herbaceous plants, habiting heaths, moors, and woods, r growing epiphytically.

LYCUR'GUS, the great legislator of he Lacedæmonians, was the son of Eunomus, King of Sparta. His history commences with the year 898 B.C., when he might have usurped the hrone on the death of his brother, but preferring to guard the kingdom for the unborn child of the latter, he devoted himself to the study of legislation.

On his nephew becoming of age, Lycurgus travelled into Crete, Egypt, and Asia, and thus prepared himself to give Sparta the laws which have rendered his name immortal. His object was to regulate the manners as well as the government, and to form a warrior nation, in which no private interest should prevail over the public good. It is said that Lycurgus persuaded the Spartans to swear that they would observe these laws till his return from another journey, and that he then departed, and they never heard of him more. One account states that he starved himself to death, but it is more probable that he retired to private life, and died naturally, as Lucian records, at the age of eighty-five. A great number of the laws accredited to Lycurgus are known to have been common to the whole Doric stock from the earliest period.

LYDD, borough of Kent. It is 67¾ miles from London, on the S. Rly. The town is now an inland one as the sea has receded. It was a Cinque Port in the Middle Ages. The explosive, **lyddite,** was tested near here; hence its name. Pop. (1931) 2,778.

LYDDA (modern **LUDD**; Heb. *Lôd*), a city of Palestine, in the Plain of Sharon, first mentioned in *Ezra* ii, 33 and *Neh.* vii, 37. Under the Romans it was capital of a district of Judea. The town was occupied by the British in Nov., 1917.

LYDDITE. *See* EXPLOSIVES.

LY'DENBURG, a town of the Transvaal, South Africa; was established in 1847, and for eleven years the capital of a small independent Boer republic, which subsequently united with the Transvaal. It is near the gold-fields worked by the Portuguese, and reopened in 1873. Pop. (white), 1,500.

LYDFORD, village of Devonshire. It stands on the River Lyd, 8 miles from Tavistock, on the S. Rly. It is on the edge of Dartmoor and in the Middle Ages was a borough and market town. As a stannary town the courts were held in Lydford and here was the stannary prison. **Lydford gorge** is one of the beauty spots of the district. Pop. 2,232.

LYDIA, an ancient and powerful kingdom of modern Asia Minor which extended eastward from the Ægean to the River Halys, and comprised Paphlagonia (Black Sea littoral), Bithynia, Mysia (at the Dardanelles), Lydia Proper, Lycia, Phrygia, and part of Cappadocia. Sardis was the capital. The Lydians were a highly civilized people, improvers and inventors in music and metallurgy. Their kingdom attained its highest prosperity under the Mermnadæ dynasty (about 716 B.C.), and ended with Crœsus (546 B.C.), who was conquered and Lydia annexed by the Persians under Cyrus.

LYDIAN-STONE, a siliceous flinty slate, having the appearance of black velvet, found in many countries, but first brought from Lydia and used as a touchstone.

LYDNEY, town of Gloucestershire. It is in the Forest of Dean, 9 miles from Chepstow, and is reached by the G.W. Rly. There are coal mines in the neighbourhood. In Lydney Park, the seat of Lord Bledisloe, Roman remains have been found. Pop. 3,775.

LYE, a term applied to the alkaline solutions of potassium or sodium hydroxides or carbonates. The former are termed 'caustic lyes,' and are used mainly in soap-making; the latter are largely employed for scouring purposes, and for the removal of grease from metals and other substances.

LYELL, Sir Charles. British geologist. He was born in Angust, 14th Nov., 1797, the son of Charles Lyell, a botanist, and went to Exeter College, Oxford. He became a barrister, but gave his time to travel and the study of geology. In 1832–33 he was professor of King's College, London, and in 1864 was president of the British Association. In 1848 he was made a knight, and in 1864 a baronet. He died 22nd Feb., 1875.

Lyell's work had a great influence on the modern study of geology. His chief book is *The Principles of Geology*, a standard work on the subject. He also wrote, *The Geological Evidences of the Antiquity of Man*, and left *Letters and Journals*, which were published in 1881.

LYGINODENDRON, a genus of Pteridosperms (q.v.), comprising some of the most interesting of Carbonif-

erous plants. *L. Oldhamium* had the general appearance of a large tree-fern, but bore genuine seeds (formerly known as Lagenostoma) of complicated structure, enclosed in a characteristic husk or cupule. The microsporangia (formerly called Crossotheca) were grouped on leaves which also bore barren leaflets.

LYGODIUM, a genus of tropical and temperate Ferns, family Schizæaceæ. The plants twine by means of their mid-ribs, a rare feature in Ferns.

LYLY, John, English dramatist and writer, born about 1553, died 1606. He studied at Magdalen, Oxford, and at Cambridge, and attempted to reform and purify the English language in two romances entitled *Euphues, or the Anatomy of Wit* (1580) and *Euphues and his England* (1581). A specimen of Euphuism may be found in Sir Walter Scott's *Monastery*. Lyly's plays include *Endymion* (1591), *Alexander and Campaspe* (1584), and *The Woman in the Moone* (1583). Lylyesque comedy was imitated by Ben Jonson in *Cynthia's Revels*, and parodied by Shakespeare in *Love's Labour's Lost*.—Cf. J. D. Wilson, *John Lyly*.

LYME-GRASS, the popular name of certain grasses. One species, *Elymus arenarius*, is a native of Britain. They are all coarse grasses.

LYME-REGIS, a municipal borough and watering-place of Dorset, England. The district is of geological importance. Lyme-Regis has a considerable export trade in cement. Pop. (1931), 2,620.

LYMINGTON, a municipal borough of Hampshire, England, a seaport and yachting centre. The town was long important in the salt trade. Pop. (1931), 5,157.

LYMPH is the tissue fluid found filling the spaces between the cells of the tissues of the body in a manner similar to a soaked sponge. The lymph may be regarded as part of the blood plasma which exudes through the walls of the capillaries, bathes all the tissues, and then passes into the network of small vessels called lymphatics. These gradually increase in size as they approach the thoracic duct, the main lymph channel, which is situated in the chest, and from which the lymph is returned to the blood system by entering the left internal jugular vein.

The lymphatics in the abdominal cavity, known as lacteals, take the products of digestion which are absorbed through the wall of the intestine, and these are carried through the lymphatic system to the blood system to be finally distributed among the tissues. After a meal, during the process of absorption, the lymph appears milky, from the presence of minute particles of fat, but in a fasting animal the lymph is a transparent fluid of a slightly yellowish colour. All the lymphatics of the body at some point pass through the lymphatic glands, where leucocytes are formed, and these leucocytes are carried by the lymph stream to the blood-vessels.

LYNCHBURG, an industrial and tobacco-exporting city of Campbell county, Virginia, United States, on the James River. It was founded by John Lynch in 1786, and first incorporated in 1823. Pop. (1930), 40,661.

LYNCH-LAW, a term applied to any rough-and-ready method of administering mob-justice apart from the law. The term originated in the action of one, Charles Lynch (1736–96), a farmer of revolutionary convictions, who lived in Virginia, United States, and who supported his convictions by hanging up by the thumbs men of Tory politics until they cried out 'liberty for ever.'

LYND, Robert, British writer and critic. Born in Belfast, the son of a Presbyterian minister, 20th April, 1879, he was educated there. After graduating at Queen's College, he settled in London and joined the staff of *The Daily News*. After a time he became the literary editor of that paper, a post he retained when it became *The News-Chronicle*. He wrote also a good deal for weekly and other periodicals, chiefly reviews of books and essays. His many published books include, *Home Life in Ireland*, *The Art of Letters* and *The Peal of Bells*. His wife, Sylvia, is also a writer both in prose and verse.

LYNEDOCH (lin'dok), **Thomas Graham,** Lord, British general, born 1748, died 1843. Until 1792 he lived as a country gentleman, but when his wife died he entered the army as a volunteer, taking part in the retreat to Coruña, and the Walcheren expedition. Appointed to command the forces besieged by the French at Cadiz, he gained the victory of Barossa (1811), joined Wellington's army, and engaged in the Peninsular War. He was present at Vittoria and at the siege of San Sebastian, and in 1814, after the unsuccessful siege of Bergen-op-Zoom, he was created Baron Lynedoch.

LYNN, a city of Essex county, Massachusetts, United States, on the north side of Massachusetts Bay. It is one of the principal boot-manu-

facturing centres of the world, and has also large electrical apparatus manufactories. Pop. (1930), 102,320.

LYNN CANAL, a fjord of Alaska, stretching 60 miles northwards from Admiralty Island, and culminating in the Chilkat (west) and Chilkoot (east) inlets. It averages 6 miles in breadth. Skagway lies on the Chilkoot inlet, and is the terminus of the railway to the Klondyke. Chilkat is a salmon-canning centre.

LYNN REGIS, or **KING'S LYNN** as it is now always called, a seaport town and municipal borough of Norfolk, England, on the Wash. It is of considerable antiquity. The church of St. Margaret (1100) and the remains of a thirteenth-century Franciscan friary are prominent. Pop. (1931), 20,580.

LYNTON, a watering-place of Devonshire, England. Pop. (1931), 2,012.

LYNX, the popular name of several species of feline carnivora, resembling the common cat, but with longer legs, ears longer and tufted with a pencil of hair, and tail shorter. The lynxes have been long famed for their sharp sight and their brilliant eyes.

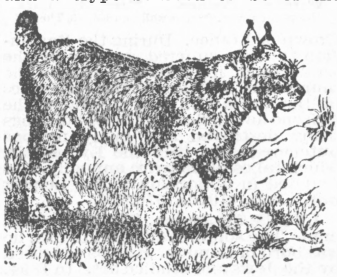
The common European lynx is the *Felis lynx*, while the pardine lynx (*F. pardina*) is native to Southern Europe. The Canadian lynx is the *F. canadensis*; the bay lynx, or American wild cat (*F. rufa*), is found in Canada and the United States; and the plateau lynx (*F. baileyi*) is indigenous to Colorado, Utah and Arizona. In Asia lynxes are tamed for hunting. The fur is valuable.

LYON KING-OF-ARMS, or **LORD LYON,** in Scotland (since 1370), the heraldic officer who presides over the Lyon Court. The Lyon Court is charged with the recording of pedigrees, settlement of disputes regarding precedence, the inspection of arms and ensigns-armorial of all Scottish noblemen and esquires, and the authorization of armorial bearings and their registration. The Registry of the Order of the Thistle is an office of the Lord Lyon.

LYONNAIS (lē-on-nā), an ancient province of France, of which Lyons was the pre-Revolutionary capital. It now forms (approximately) the departments of the Rhône, Loire, Haute Loire, and Puy-de-Dôme.

LY'ONS (Fr. *Lyon*; Lat. *Lugdunum*), the second city of France in industrial importance, and the third in respect of population. It is the capital of the department of the Rhône. The town is built partly on a peninsula between the Saône and the Rhône, and partly on the opposite banks of the rivers on either side. The rivers are crossed by over a score of bridges, and the city is surrounded by a number of detached modern forts. Parts of the city are old, squalid, and unhealthy, but as a whole it has a stately and imposing appearance, and is finely seen from the Fourvière, an eminence on the right bank of the Saône, crowned by the church of Notre Dame, whence there is a most magnificent view extending to the Alps.

Among the chief buildings are the cathedral, mostly of the thirteenth century, completed towards the end of the fifteenth century; the church of St. Martin d'Ainay, with a cupola supported by ancient Roman columns and a crypt believed to be of the



Lynx (*Felis lynx*)

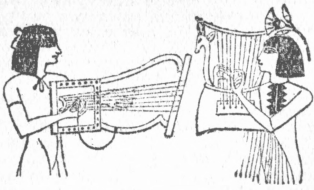
ninth century; the church of St. Nizier, a fine example of flamboyant Gothic; and the Hôtel de Ville (1646–55), considered the finest of its kind in France. In the archiepiscopal palace, situated near the cathedral, 1,000 Protestants were butchered in 1572 as a sequel to St. Bartholomew. The public library has nearly 500,000 volumes. The chief educational establishments are a university, founded in 1834, a Roman Catholic college, a Lycée, a normal school, la Martinière, and a school of industrial arts.

Lyons carries on various industries, but is the centre of the world's silk manufacture, which provides employment in the town and environs to about 240,000 people. It has two broadcasting stations (465·8 M., 1·5 kw. and 287·6 M., 0·7 kw.).

History. The origin of Lyons cannot be traced, but its foundation has been ascribed to Greek refugees. What is certain is that when Cæsar invaded Gaul it had become a place of some importance. Towards the end of the second century it numbered thousands of Christians among its inhabitants. It was sacked by the Huns and Visigoths, and in the eighth century fell for a time into the hands of an army of Saracens from Spain, but

recovered its prosperity under Charlemagne, on the dissolution of whose empire it became the capital of the Kingdom of Provence.

In 1312, during the reign of Philip the Fair, Lyons was annexed to the



Played with plectrum. Played with fingers
Egyptian Lyres, from a wall painting at Thebes

Crown of France. During the Revolution the city suffered severely by the paralysis of its industry, and by the murderous excesses of the emissaries of the Paris Convention, whom the citizens had defied, the chief buildings being destroyed and many persons butchered. In 1916 the Lyons fair, which takes place twice annually, was founded in opposition to the Leipzig fair. Pop. (1926), 570,840.

LYONS, Sir Joseph, British business man. The son of Nathaniel Lyons, he was born in London. He was educated by the Jews and studied art. In 1894, having foreseen the possibilities of the catering business, he opened a tea shop in London, and this was the first of many. Hotels were added, and the firm opened factories to produce many of the products sold, the result being that it became the largest business of its kind in the land. In 1911 Lyons was knighted and he died 22nd June, 1917.

LYONS, Joseph Aloysius, Australian politician. Born in Tasmania, 15th Sept., 1879, he finished his education at the university of Tasmania and became a teacher. In 1909 he was elected to the legislature of the state in the Labour interest, and from 1914–16 he was treasurer and minister of education. From 1923 to 1928 he was prime minister of the island. In 1929 Lyons was elected to the House of Representatives of the Commonwealth and at once joined the ministry of Mr. Scullin as postmaster-general and minister of works. He was acting treasurer during Mr. Scullin's absence in London in 1930, but in Jan., 1931, he resigned.

LYRE, one of the most ancient stringed instruments of music, consisting of a body with two horn-like pieces rising from it, and a cross-piece between the horns, from which to the lower part the strings were stretched. It was used by the Egyptians, Assyrians, and Greeks. It is said to have had originally only three strings, but the number was afterwards increased to seven, then to eleven, and finally to sixteen. It was played with the *plectrum* or lyre-stick of ivory or polished wood, also with the fingers, and was used chiefly as an accompaniment to the voice. The body of the lyre was hollow, to increase the sound.

LYRE-BIRD (*Menura superba*), a perching bird, somewhat smaller than a pheasant, native to New South Wales and South Queensland. The tail of the male is remarkable for the three sorts of feathers that compose it, which by their shape and arrangement resemble the form of an ancient

Lyre-bird (*Menura superba*)

Greek lyre. It has a pleasing song, and is said to be capable of imitating the voices of other birds. The male has a 'play-ground,' where he dances and struts. There are two related species, one (*M. alberti*) with a similar range; and the other (*M. victoriæ*) found in Victoria.

END OF VOL. VI.